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ECONOMIC CAPABILITIES

OF THE SINO-SOVIET BLOC MERCHANT MARINE

1960-75

AN ADDRESS BY

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BRIEFING OUTLINE

ECONOMIC CAPABILITIES OF THE SINO-SOVIET BLOC MERCHANT MARINE 1960-75

I. Sino-Soviet Bloc Maritime Fleet

- A. Size
- B. Fleet Characteristics
- C. Fleet Operations
- D. Vessel Acquisitions

II. Performance of the Sino-Soviet Bloc Maritime Fleet, 1950-75

III. Seaborne Foreign Trade of the Sino-Soviet Bloc

- A. Patterns of Seaborne Foreign Trade
- B. Adequacy of the Bloc Merchant Marine

IV. Potential of the Bloc Maritime Fleet as a Competitor to the Free World

- A. Status of Bloc Shipbuilding Industry
- B. Shipping Services to the Free World
- C. Effects of Diversion of Seaborne Traffic to Overland Carriers
- D. Other Means of Bloc Competition with Free World Maritime Powers

V. Evaluation of Bloc Shipping, 1975

Charts

SECRET

GIST

ECONOMIC CAPABILITIES OF THE SINO-SOVIET BLOC MERCHANT MARINE 1960 - 1975

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ECONOMIC CAPABILITIES OF THE SINO-SOVIET BLOC MERCHANT MARINE 1960 - 1975

INTRODUCTION

1. I am pleased to join you today in Project WALRUS and to have the opportunity to guide you "Through the Looking Glass" as we consider the status and planned development of the Sino-Soviet Bloc merchant marine.

2. In my address today I shall survey briefly the ability of the Bloc to satisfy its own maritime requirements, and also attempt to assess its capability to present an effective competitive threat to Free World maritime powers.

3. I am also distributing a more detailed report on this subject which I hope will be of value for your study team meetings.

4. As we in this room know well, the maritime industry is one of those which, along with its importance to peaceful commerce and intercourse among nations, has an equally important role to assume in those troubled times when the seas may become the life-line on which the survival of a nation depends.

5. By examining Bloc maritime programs we can all gain a more meaningful insight into Bloc maritime strengths and capabilities.

6. We can then take into account those strengths and capabilities in arriving at policy formulations on the future of our own merchant marine--not only in times of war or peace--but, indeed, in those no-war, no-peace situations which have characterized the international scene since World War II.

7. For we must all recognize the necessity to be alert constantly to the fact that a nation's ability to wage, or to withstand, economic warfare may be as important ultimately as its ability to participate in hot wars.

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I. THE SINO-SOVIET BLOC MERCHANT FLEET.

A. SIZE.

8. Figure 1 shows that a substantial growth--75 percent--has taken place in Bloc fleets since 1950. Its present 5 million DWT is 3.5 percent of active world fleet of 138 million DWT.

FLASH #1

9. Growth will continue at impressive pace--Bloc will reach over 6 million DWT in 1960--4 million, Soviet flag; 1 million, Satellite flags--mostly Polish; little over 1/2 million, Chinese flag.

10. 20 percent of tonnage will be tankers--mostly the 1 million tons in Soviet tanker fleet. To compare, world tanker fleet at end of 1958 was 54 million DWT.

11. By 1965 Bloc fleet will double compared to 1958 and in 1975 will be 3.5 times 1958. Tanker proportion remains same.

12. Largest relative increase occurs in Chinese fleet--which in 1975 will be 6 times 1958.

13. Biggest absolute increase is 8 million ton growth in Soviet fleet, including 1.5 million DWT tankers.

14. This growth can be compared with our estimates of world fleet growth, as shown in Figure 2.

FLASH #2

15. As chart shows, the Bloc fleet will grow from 3 percent of world fleet in 1958 to estimated 8 percent in 1975.

16. Note that our projections of world fleet were depressed to account for trends toward regional trading groups . . . which could result in shorter lengths of haul, hence smaller requirements for ships.

17. In comparison with the Bloc share of total world fleet, the US active fleet was 10 percent of world fleet in 1958--21 percent if we include the reserve fleet.

18. The British share of total world fleet was 18 percent. NATO countries collectively, with 83 million DWT, were 60 percent of world fleet.

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B. FLEET CHARACTERISTICS.

SIZE.

FLASH #3

19. Chart 3 shows Sino-Soviet Bloc fleet characteristics of size, speed and age for 1960.

20. Two largest groupings are 3 - 5,000 DWT group and 9 - 11,000.

21. The 3 - 5,000 group contains a high proportion of bulk carriers. Among them is the Polish built CHULYM class, the B-32 series of colliers, of 3,800 DWT.

22. Also in this group is the 5,000 DWT DONBASS class, the Polish built B-31 colliers. Both classes are in the Soviet and Polish fleets.

23. The 9 - 11,000 group is primarily general cargo ships. The USSR total of 304,000 DWT is weighted heavily with US Lend-Lease LIBERTY ships.

24. Satellite share in 9 - 11,000 group is mainly Polish-built B-54's, the MARCELI NOWOTKO class; and the East German Type IV's, the FRIEDEN class. Both classes are around 10,000 DWT with speeds of 15 - 16 knots.

25. Next largest group in our size diagram is 11 - 13,000 group. It includes Kazbek class, work-horse of Soviet tanker fleet, at 12,500 DWT and 12 knots speed.

SPEED CHARACTERISTICS.

26. Figure 2 shows over half Bloc fleet vessels in 10-12 knot grouping weighted heavily by Kazbek tanker and by bulk carriers of the Soviet fleet.

27. The European Satellite fleets in 1960 will have more vessels in 15-16 knot speed range than any other Bloc fleet.

AGE CHARACTERISTICS.

28. Over one-fourth of total Bloc tonnage is 25 years or over. Eleven percent (330,000 gross tons) of Soviet tonnage is in 40 to 44 year group.

29. These hoary veterans are a liability but plans are to scrap them between 1965-75--if they last that long.

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30. Improvements underway in age factor is shown by fact that from 1957-1960 there was a decline of ships 25 years or over--from 35 to 28 percent in Soviet fleet; from 19 to 10 percent in Polish fleet.

31. 41 percent of Bloc fleets is under 5 years of age in 1960 as result of new acquisitions and planned additions.

32. By way of comparison, total world fleet in 1957 had 22 percent under 5 years and 15 percent over 25 years.

33. This survey of size, speed and age of Bloc fleets in 1960 shows them on the average to be competitive with world average, under normal competition. They are, of course, not competitive with modern segments of the world fleet.

C. FLEET OPERATIONS.

34. Soviet operations are both domestic coastal and foreign trade--Satellites are almost entirely in foreign trade--Chinese are almost entirely in domestic coastal trade.

35. Greatest share of cargo handled by Soviets is in domestic coastal trade but more than half its tonnage is assigned to foreign trade.

36. Soviet fleet operates ~~out of~~ 5 Basins: BLACK SEA-AZOV; BALTIC SEA: FAR EAST; NORTHERN BASIN and CASPIAN SEA.

37. Major Soviet routes are from the:

Baltic	--	North Sea and Atlantic Europe North Africa South and Southeast Asia South America, Gulf and Canada
Northern Basin	--	Baltic, Atlantic Europe, Mediterranean
Black Sea	--	Mediterranean Continental Europe South and Southeast Asia Far East West Africa
Far East	--	South and Southeast Asia Canada Atlantic Europe

38. Heaviest Soviet movements:

General cargo, coal, timber and grain in the Baltic/North Sea/Atlantic Europe area.

Crude and POL products Black Sea to Europe, lesser extent to Far East, South America and North Africa.

Timber and apatite, from Northern Basin to Atlantic Europe.

Ores -- Black Sea to Europe.

General cargo, iron ores, and other raw materials between Black Sea and Mediterranean, South and South East Asia.

39. Soviet hauls are basically short to medium range. Growing frequency of exports to areas from which little importing is done causing increased return runs in ballast which Soviets are trying to reduce by soliciting more foreign interport cargoes.

40. Soviets operate scheduled service to any extent only in domestic coastal trade. Less than 9 percent of its foreign and intercoastal fleet is on scheduled runs .

41. In the Satellites only Poland has fleet necessary to engage in widespread operations. Polish fleet works pretty much same areas as USSR, but in contrast, 75 percent of Polish tonnage is on regularly scheduled runs.

42. Principal scheduled Polish runs are to Mediterranean, Far East, South Asia, South American and Atlantic Europe.

43. Polish tramp runs are mainly in the Baltic, along the European coast, and to Mediterranean and Black Sea.

44. Greatest share of Polish fleet is on South Asia and Far East lines; but more cargo tons are moved in the short haul runs in the Baltic and Atlantic Europe.

45. Preponderance medium and long hauls gives Poles average length of haul--2,600 miles--compared to 1,800 for Soviets.

46. Other Satellite fleets:

East Germany--older ships in European range; never ships in Far East trade.

Carefree Czechs have assigned entire fleet to the Far East run--all 6 vessels.

Rest of Satellites generally operate in Mediterranean and and Black Sea areas.

47. Chinese fleet is confined to domestic coastal traffic except for some traffic to Hong Kong, North Vietnam and North Korea. 75 percent of China fleet is on unscheduled runs and this percentage will remain 50 to 70 percent in the near future.

48. CHINAT interdiction of Formosa Strait causes Chinese Communists to divide coastal traffic into two distinct areas--North Coast and South Coast.

49. Present pattern of China shipping gives low average length of haul of 460 miles. This will not change much unless the Formosa Strait is open or until Communist Chinese get more active in in international trade.

D. VESSEL ACQUISITIONS.

50. From 1960 to 1975 greatest volume of acquisition will be by Soviets --8 million tons, including over 1 million to replace retired ships.

51. Chinese will add over 2 million with no provision for scrappings. They will sail their ships until they sink.

52. Satellite fleets will acquire almost 3 million DWT, including 280,000 allowance for scrapping.

53. From World War II to 1958 Soviet acquisitions had little effect on operating characteristics of fleet but 1958-59 marked turning point in improving fleet.

54. Addition and planned additions of such new types as shown on Figure 4: Polish B-54 cargo ship; USSR LENINSKIY KOMSOMOL and USSR PEKIN tanker with their modern characteristics will improve fleet.

FLASH #4

55. ~~In addition those shown~~ USSR is adding 15 distinct dry cargo types, and 5 distinct tanker types. Additions will be made at rate of 500,000 DWT annually . . . 25 percent of tonnage will be tankers.

56. Effect of Soviet program will be to reduce average age of vessels from 14.1 to 11.6 years; to increase average speed from 11.6 to 14.9 knots; and increase average size from 5,300 to 7,000 DWT.

57. Chinese acquisitions following world trend toward larger and faster vessels. No bulk carriers are planned, although they could be used to advantage. Tankers of 20 to 30,000 class will appear by 1967.

58. By 1963 Chinese will be turning out own ships at rate of 100,000 tons per year; will reach 150,000 by 1975. Annual additions from domestic production will climb from 27,000 GRT in 1959 to 116,000 GRT in 1975.

59. Dependence on foreign imports of shipping will decline somewhat but within next five years they will still acquire 300,000 GRT from foreign sources.

60. Chinese program will give them a very modern fleet with average speeds of 12 knots; coastal vessels will be less than 10,000 GRT but foreign trade vessels will include some up to 20,000 GRT, including a type similar to the US Mariner. In 1975 two-thirds of Chinese fleet will be less than 10 years old.

61. Satellite acquisitions will come primarily from own yards, particularly Polish and East German yards. Poles are the big suppliers and five of their new types are shown on Figure 4.

62. By 1965 the Poles will have 8 of the B-70 tanker shown on the figure; and another 10 will be added by 1975. They will also have three of the B-73 diesel tankers shown on the figure.

63. Not much is known about the nuclear tanker but production is planned by 1970.

64. The East Germans will be getting at least 30 of the B-54 cargo ships shown on the chart. They may also get some of the B-70 tankers, but most of their tankers will be the outmoded Kazbek type.

65. In addition to those shown on Figure 4 the Poles and East Germans are turning out a number of smaller but fast, modern vessels.

66. Poles will make their biggest acquisitions from 1960 to 1965, in an effort to help solve their deteriorating foreign exchange situation. They will add 720,000 DWT in those years. From 1965-1975 Polish acquisition rate will reduce to 250,000 DWT per five year period.

67. The other Satellites will acquire vessels at a fairly steady rate of 450-500,000 tons during the period.

68. Polish fleet by 1975 will have average size of about 8,000 DWT compared to 1958 figure of 5,300; speeds will increase from 12.6 to 14 knots; and age will be about 12.5 years. The other Satellites will have slightly better characteristics on all counts since they are building on such a small base.

69. In summation, the acquisition program through 1975 will result in a total Bloc fleet with good competitive capabilities. It will be in its best competitive position in 1965 when half its tonnage will be under five years of age and of modern design. By 1975 the Bloc fleets will be larger and still competitive. Over 2 million DWT will be under 5 years of age (12 percent of tonnage). The average age for the Bloc fleet will be between 11 and 12 years and average speeds will be about 14.5 knots.

II. PERFORMANCE OF SINO-SOVIET BLOC MARITIME FLEETS, 1950-1975.

FLASH #5

70. Figure 5 shows our estimates of cargo carried in domestic and international trade by the Bloc fleets. Performance of the Soviet and Chinese fleets is much higher in relation to fleet size than is Satellite performance. This reflects the heavy preponderance of domestic cargo in China and the USSR, which with its low average length of haul enables more cargo to be carried per vessel year.

71. Figure 5 shows total cargo carried in 1975 to be three times cargo carried in 1958 and two and one half times that in 1960.

72. The share of domestic cargo to total cargo will decline from about 70 percent in 1958 to 49 percent in 1975. The strong shift this represents to international carriage is not reflected in the vessel tonnage assigned by 1975 to the carriage of domestic and international trade.

73. In fact the tonnage assigned to domestic trade increases proportionately with trade whereas tonnage assigned to international trade increases less. (International trade increases 440 percent but cargo tonnage increases only 380 percent).

74. This phnecmenon is explained by fact that while average length of haul in domestic trade will not change much, there will be a noticeable decrease in length of haul in international trade. This will allow vessels to carry more cargo per year and they will also be faster giving a quicker turnaround time.

75. In Figure 6 we show the performance of Bloc fleets compared to the amount of world international seaborne trade.

FLASH #6

76. The significant figures here are the share that Bloc carriage of international trade represents of total world carriage.

Note: Graphic shows 2.4

77. The share, only 2.7 percent in 1958 will reach 9 percent by 1975.

78. We pointed out previously our world trade estimate may be low. Even if it were 2 billion metric tons higher the Bloc share would be 7.5 percent.

79. On either estimate this Bloc share by 1975, must be regarded as significant. But it is not high enough to indicate the Bloc fleets as a controlling factor in world carryings.

III. SEABORNE FOREIGN TRADE OF THE SINO-SOVIET BLOC.

A. PATTERNS OF SEABORNE FOREIGN TRADE.

1. USSR.

80. In Soviet seaborne trade in 1956, exports were twice the volume of imports. Seaborne exports increased 100 percent in 1957 alone.

81. Seaborne trade involving major bulk commodities is mainly with Western Europe and European Satellites. Trade with underdeveloped nations is largely general cargo consisting of manufactured goods.

82. The five most important commodities in Soviet seaborne trade are crude oil, and petroleum products, coal, timber, ores, and apatite, the latter three being important only as exports.

83. The volume of foreign trade cargoes carried in Soviet ships is planned to increase by 183 percent by 1965, while the volume carried in foreign ships is planned to rise only 9 percent.

84. No significant changes in the pattern of Soviet seaborne trade are indicated by these increases.

2. COMMUNIST CHINA.

85. About one-half of China's total trade moves by sea. Trade with the Free World is carried predominantly by sea, while most Bloc trade moves by land.

86. China's exports are twice the volume of her imports, in terms of her seaborne trade.

87. Most of China's seaborne import trade is with Western Europe, while her exports go to Hong Kong and other Southeast Asian countries.

88. Agricultural products and minerals dominate the exports, imports consist mainly of industrial raw material and capital equipment.

89. Little change is expected in the existing pattern of trade areas, but a slight decline in the ratio of exports to imports may be anticipated.

3. EUROPEAN SATELLITES.

90. About one-third of Poland's foreign trade moves by sea. The heaviest movement of Poland's seaborne trade is in the Baltic, followed by trade with Scandinavia and Europe.

91. Coal is the major export cargo, the largest single import cargo is iron ore.

92. East Germany and Czechoslovakia move about 20 percent of their foreign trade by sea. About one-third of German and one-fifth of the Czech seaborne trade moves in the Baltic. Both countries move goods to Asia, South America, and the Mediterranean.

93. Rumanian traffic is largely in two areas, the Black Sea and the Mediterranean, and Europe.

94. Hungarian, Bulgarian, and Albanian seaborne foreign trade is relatively insignificant.

95. The heaviest trades for the Bloc in general are the local traffic in the Baltic and Atlantic Europe area, followed by Europe and the Baltic to and from the Mediterranean and the Black Sea.

96. China Southeast Asia trade is important and Asian trade with Europe is significant.

97. No great changes are anticipated in the traffic patterns in 1975, although some increases may occur in the Europe-Near and Middle East trade, China-South Asia trade, and the Europe-South America trade.

B. ADEQUACY OF THE BLOC MERCHANT MARINE.

FLASH #7

98. In 1958, 68 percent of the Bloc's 58 million tons of seaborne trade was carried in Free World vessels.

99. This means that the Bloc needs 3.2 million tons of foreign vessels to carry its foreign trade, or as much as 4.5 million tons if liner service is taken into account.

100. In short, the Bloc is presently dependent on the West for the carriage of two-thirds of its seaborne imports and exports.

101. Such a situation is not only lacking in appeal to the Bloc nations in their struggle for increasing prestige and Bloc self-sufficiency, but an expensive drain on their foreign exchange.

102. By 1965, foreign vessels will carry only 35 percent of the total 93 million tons of trade the Bloc will move by sea.

103. By 1975, the Bloc will have largely achieved the goal of self-sufficiency, and will move from three-fourths to nine-tenths of its seaborne foreign trade and virtually all of its domestic coastal and intercoastal trade.

104. The trend since 1950 has been for greater self-sufficiency and less dependence on foreign vessels. Progress has been made towards achieving this objective and by the end of the period covered in this presentation, Bloc dependence on Free World shipping will be very slight.

IV. POTENTIAL OF BLOC MARITIME FLEET AS COMPETITOR TO FREE WORLD.

A. BLOC SHIPBUILDING INDUSTRY.

105. Since War II USSR and European Satellite shipbuilding industries have become modern and capable. Having completed its naval build-up, the USSR could allocate facilities to merchant building and has about eliminated dependence on non-Bloc shipbuilders.

106. Peak production year in USSR was 1955 with 100,000 GRT of merchant vessels and 190,000 tons for naval vessels. Poland and China together produced about 260,000 tons in 1958. These are production figures at optimum output rate. Considerable more could be done.

107. Soviet shipyards range from primitive to some such as Baltic and Admiralty Yards in Leningrad, and Nosenko Yard in Nikolayev which in some respects more advanced than those in Western Europe and US.

108. Soviet techniques are generally good. A little slow on developing photolofting and automatic gas cutting of hull plates, but will have complete system by 1961.

109. Soviets lead the world, however, in use of welded hulls and block assembly of ships. They have developed serial line construction more than any other country.

110. They have good designers and technicians, but poor design practices and low labor productivity make shipbuilding expensive. They are advanced in research and development, model testing and design bureau facilities, and training schools.

B. SHIPPING SERVICES TO FREE WORLD.

111. The most obvious service to free world is category between foreign ports in Figure 5.

FLASH
#5

112. In 1958 two-thirds of 815 000 tons carried by Satellites between foreign ports was between Western ports, but less than half of the USSR's 7.5 million tons was between Western ports.

113. This gives small Bloc total of about 3 million tons, a drop in the bucket compared to world total of 1 billion tons.

114. Bloc needs for foreign exchange make it certain this carriage of Western goods won't decline as proportion of total cargo between foreign ports. But even on present trends it won't get over 1 percent of total Western trade even by 1975.

115. Another service to West in a sense is Bloc carriage of its own exports to Free World. This was 7 - 8 million tons in 1956 (5 - 6 Soviet; 2, Satellites).

116. This may reach 35 to 40 million tons by 1975. But even when combined with Western interport for a total of 45 - 50 million tons it is only 2 - 3 percent of total world trade.

117. What would happen if the Bloc should divert its mounting volumes of domestic coastal and intercoastal trade to overland movements, and used the fleet released by this to compete in international trade.

118. The Soviets have talked about this, particularly about using White Sea - Baltic inland waterway, and mid-river shipments to points along Northern Sea Route. This policy has also stopped completely inter-coastal movement of POL from Black Sea to Soviet Far East.

119. In fact much of this diversion is unlikely. Many points on Northern Sea Route and Soviet Far East are accessible only from the sea. Also many of the ships in Soviet coastal traffic are the heavy type, not really suited for foreign trade duty.

120. Finally, many of the planned Soviet additions through 1975 are suitable only for coastal operation. So that at best probably not even 2 million DWT could be released to foreign trade.

121. The Satellites have no diversionary possibilities since their coastal trade and tonnage involved is negligible.

122. Chinese, on the other hand, have used all their own fleet, as well as foreign shipping, to carry their coastal trade.

123. To divert this traffic to the railroads could add to the problems which already beset the Chinese inland transport system. But the tonnages to be diverted (14 million in 1958) would be only a small 4 percent of that actually moved by the railroads.

124. Even if the estimated 40 million tons to be moved by coastal shipping in 1975 were diverted to overland transport it would not be the straw to break the coolie's back particularly in view of their programs for rail expansion and construction.

125. In brief, diversion of coastal traffic would add by 1975 less than 3.5 million DWT to the 13 million DWT already to be used by the Bloc in foreign trade.... This would be only 1.5 percent of total world-ocean going fleet in 1975.

126. There are other means of competition. The Bloc could use Free World Shipping to carry its own import-export trade, and then use its own foreign trade fleet (3 million tons in 58 and 13 million tons in 1975) to compete for Free world cargo.

127. The over-all effect on Western shipping would be negligible. But its piecemeal disruptive effects could be rather severe, not only in 1975 but also at present.

128. The Poles would probably not do this since most of their shipping is on scheduled runs.

129. The Soviets on the other hand are mainly in tramp service. They could emphasize political at the cost of economic motivations and place almost 2 million DWT into almost any desired trade route by 1960. Add to this rate-cutting, to compensate unfavorable operating characteristics, and the maneuver could be quite disruptive to Western shippers.

130. The hypothetical Soviet action could involve magnitudes of tonnage carried ranging from 58 million tons in 1958 to 107 million in 1975.

131. The Chinese fleet with some 1.5 million DWT in foreign trade could also offer serious competition in 1975--even without diverting shipping to blanket any specific trade. Indeed, some of this competition is already being felt.

132. The Chinese are already using some of their considerable fleet of chartered Western shipping for competition, by releasing them from China coastal trade and using them as a rate cutting instrument in Chinese foreign trade.

133. There are deterrents to the possibility of such moves on the part of Bloc nations. Both Poland and the USSR have joined international shipping conferences.

134. The USSR joined the Baltic and International Maritime Conference a year ago. The Polish fleet has a working agreement with the Baltic Conference, and also with the Madras and Pondicherry Continental Conference and others.

135. Joining these conferences is a sign that these maritime powers intend to abide by the rules of economic competition and are in the trade now primarily for economic purposes rather than political motivations.

136. Moreover, Bloc efforts to disrupt Western shipping could be circumvented by counter measures on part of Western shipping conferences and/or Free World governments.

137. The Bloc fleets are also being used in underdeveloped countries as a means of penetration.

138. Scheduled lines are expanding into Near and Southeast Asian ports.

139. Shipping agreements are being entered into with non-Bloc states. The USSR has agreements with Egypt, India and Japan. Poland has an agreement with India. East Germany has one with Egypt.

140. Both USSR and Poland have technical assistance agreements with Indonesia. Soviet personnel are training Indonesians to man the 12 Soviet vessels given to Indonesia.

141. Polish marine officers are operating Indonesian ships in the inter-island trade and training Indonesian merchant marine personnel.

142. Another important factor in assessing Bloc competitive capabilities is the move to Bloc unification of maritime resources.

143. A joint maritime organization is reportedly being planned by CEMA, the Council for Mutual Economic Aid. This organization would coordinate efforts of all Bloc fleets.

144. CEMA would also indicate sea routes to be established by the various fleets; arrange exchange of ships among members; and even control new construction in Satellites.

145. There may be opposition to this, particularly from the Poles and Czechs.

146. But the long-continuing operation of Chipolbrok, the Chinese-Polish shipping company established to handled China-European ports trade, may have set an attractive precedent.

147. If the Bloc succeeds in unifying its maritime services it will then offer a highly centralized and very effective competitive front against Free World maritime powers.

V. EVALUATION OF BLOC FLEETS AS MARITIME POWERS -- 1975.

148. The several developments outlined in this paper point to the Sino-Soviet Bloc fleets as emerging competitors to Free World maritime powers.

149. By 1975 the Bloc fleets will have increased their capacity more than 3.5 times that of 1958 and will represent 8 percent of the total world fleet.

150. This contrasts to the present time when the Bloc fleets, although compering favorably with world fleet averages, in terms of operating characteristics, are not truly effective economic competitors.

151. By 1975 there will have been noticeable increases in the size of Bloc vessels, probably an average of 7-8,000 DWT. The average age of Bloc vessels will be 11-12 years, and 12 percent of total tonnage will be under 5 years of age.

152. The most modern single fleet will be that of the relative newcomer to world maritime circles, Communist China.

153. Other areas in which the Bloc position will have improved noticeably by 1975 will be its role in the carriage of international seaborne trade, and its reduced reliance on Free World shipping.

154. By 1975 Bloc fleets will be carrying three times the cargo volume they carried in 1958. Over half of this cargo will be foreign trade cargo, and the Bloc's foreign trade fleet will have increased from about 3 to 13 million DWT.

155. Moreover the Bloc share in carriage of seaborne international trade will have increased from a little over 2 percent in 1958 to about 9 percent in 1975. This is admittedly a significant share of the carriage in international trade, although it is, of course, not a controlling share.

156. Another important development is that despite the fact that Bloc requirements for Free World shipping in 1975 will be about the same as they were in 1958, Bloc dependency on foreign shipping will be reduced substantially.

157. In 1975 Bloc fleets will be carrying from 75 to 90 percent of their foreign trade in their own bottoms, compared to only 32 percent in 1958. Moreover, with the exception of China, all fleets will be adequate to carry their own domestic coastal and intercoastal trade.

158. It is apparent, therefore, that as present plans are implemented the Bloc will have been essentially successful in reaching its goal of maritime self-sufficiency.

159. On the basis of present trends Bloc carriage of Western cargoes will reach about 14 million tons in 1975, less than 1 percent of total Western trade. If we include Bloc carriage of its own exports to the Free World, the Bloc in 1975 will be carrying about 45-50 million tons total (in service to the West) or 2 to 3 percent of total world trade.

160. These figures do not loom large in the framework of total world trade. But with its anticipated 1975 fleet there are several measures the Bloc could undertake to offer effective competition to Free World maritime powers.

161. Disruptive efforts by Bloc states could be extremely harmful to Western shipping particularly if the Bloc should follow deliberate market breaking policies aimed against specific trade routes. A concentration of Bloc shipping on particular trade routes, combined with forced rate cutting, such as China is presently doing in the Far East, could be done with sufficient intensity to hurt Western shipping operators.

162. Success of these efforts doubtful however if Western shipping associations or governments use the effective countermeasures at their disposal.

163. The Bloc has also embarked upon other measures which could make any competitive efforts on its part more effective. Among these is a decided trend toward the establishment of a centralized and unified Bloc shipping concert under CEMA.

164. The Bloc, moreover, has already undertaken some penetration activities such as the expansion of scheduled lines to the Near East, to Southeast Asia and to South America, and the negotiation of shipping agreements as typified by USSR agreements with Egypt, India and Japan. Technical assistance is another device currently being used by the Bloc as for example the Soviet and Polish technical assistance teams now in Indonesia.

165. While the Bloc fleet in 1975 will not be an overwhelming force in maritime circles, it will definitely have the capacity in 1975 to offer on a selected basis very effective competition against Western shipping.

166. Moreover, we may expect that it will be used effectively in close support of Communist international political and economic objectives.

S-E-C-R-E-T

ECONOMIC CAPABILITIES

OF THE SINO-SOVIET BLOC MERCHANT MARINE

1960-75

WARNING

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ECONOMIC CAPABILITIES OF THE SINO-SOVIET BLOC MERCHANT MARINE 1960-75

INTRODUCTION

Since 1950, most of the countries of the Sino-Soviet Bloc have been engaged in a fairly intensive drive to attain a greater self-sufficiency in their merchant marines. These programs were most noticeable, of course, in the USSR, Poland, and East Germany. In the Far East, Communist China's drive for maritime self-sufficiency became pronounced in 1956.

The primary purpose of these maritime programs has been to reduce the traditional dependence of Bloc states on Free World shipping for the carriage of their seaborne trade. This dependence has been reduced consistently over the past 8 years. As planned developments are carried out, the dependence of Bloc powers upon Free World shipping will become insignificant by 1975.

Another important aspect of these programs to be noted by Western observers is that successful fulfillment of Bloc maritime plans will have a decisive impact upon the ability of Bloc maritime powers to present an effective competitive threat to Free World

maritime powers. These programs are also giving the Bloc another potentially serious weapon for the conduct of economic penetration activities and economic warfare.

It is within this framework, therefore, that this paper analyzes the present status and planned developments of the Sino-Soviet Bloc merchant marine for the years 1960 to 1975.

I. Sino-Soviet Bloc Maritime Fleet

A. Size

In 1958 the approximately 5 million deadweight tons (DWT) of the combined Sino-Soviet merchant fleets represented only 3.5 percent of the active world tonnage of 138 million DWT.* The growth of the Bloc fleets has been substantial, however, having increased 75 percent in tonnage since 1950, and the fleets will show an even more impressive growth through 1957, as shown in Figure 1.

The combined Sino-Soviet Bloc fleets in 1960 will probably total over 6 million DWT, of which over 4 million tons will be under the Soviet flag; over 1 million tons under Satellite flags, mostly

* The tonnage and percentage figures in the text generally are rounded to the nearest whole number. Precise figures will be found in the attached charts and the Statistical Appendix. All cargo tons in this paper are in metric tons.

Polish; and 574,000 tons under the Chinese flag. Twenty percent of the total 6 million DWT will be tanker tonnage, of which 1 million DWT will be under the Soviet flag. This total may be compared with about 54 million DWT of tanker capacity in the world fleet at the end of 1958.

Available plans indicate that the Bloc fleet will more than double in capacity by 1965 compared with 1958, and the fleet capacity in 1975 may be 3.5 times that of 1958. The proportion of tanker tonnage to total tonnage in 1975 will apparently remain at about 20 percent. The largest relative increase by 1975 will probably be in the Chinese fleet, which will be 6 times its size in 1958. The largest absolute increase in tonnage, however, will be under the Soviet flag, an increase of almost 8 million DWT, including an increase of about 1.5 million DWT in tanker capacity.

As shown in Figure 2, these sizable increases within the Bloc fleets may also result in the Bloc proportion of the world fleet increasing from over 3 percent of the world fleet in 1958 to about 8 percent of the world fleet in 1975. It should be remembered, of course, that the size of the world fleet generally will vary with the

amount of international cargo moving and with shifts in trade patterns. Our estimates of the world fleet and world international cargo in 1975 have been weighted by the apparent trends toward regional trading groups, which could result in shorter hauls and a smaller requirement for vessels. The growth of the world fleet has been estimated, therefore, at a slower rate than in the years since World War II. If the trend toward regional trading does not result in shorter hauls, the world fleet in 1975 may be larger and the Sino-Soviet Bloc fleets would form a smaller proportion of the total than our estimated 8 percent for 1975.

In comparison with the Bloc fleet, the US active fleet amounted to 10 percent of the world total in 1958 and, if the reserve fleet is included, to 21 percent of world tonnage. The fleet under the British flag represented 18 percent of the world active fleet in 1958. NATO countries had a total of 83 million DWT under their flags at the end of 1958, or 60 percent of the active world fleet.

B. Fleet Characteristics

Figure 3 shows the distribution of the Bloc fleets according to size, age, and speed of ships for the year 1960.

1. Size

The two largest groupings according to size are the 3,000-to-5,000-DWT group, which contains a high proportion of bulk carriers (ore, coal, and lumber), and the 9,000-to-11,000-DWT group, which are general cargo ships.

In the 3,000-to-5,000-DWT group is the Chulym class, the Polish-built B-32 series of colliers, originally 3,200 DWT and later modified to 3,800 DWT. Also in this group is the Donbass class, the Polish-built B-31 series of colliers, of about 5,000 DWT. These two ships are in both the Soviet and the Polish fleets.

In the 9,000-to-11,000-DWT group the largest part of the 804,000 DWT under the Soviet flag are American Liberty ships loaned to the USSR under World War II Lend Lease and still owned by the US. The 568,000 DWT under the Satellite flags are mainly the new Polish-built B-54's, the Marceli Nowotko class, and the new East German Type IV's, the Frieden class, both of 10,000 DWT and speeds of 15 to 16 knots.

The next largest grouping is 11,000 to 13,000 DWT, in which fall the Soviet-built tankers of the Kazbek class, of 12,500 DWT and a speed of 12 knots.

2. Speeds

The distribution of Bloc fleets according to speed in Figure 3 shows that over one-half of the vessels in Bloc fleets fall in the 10-to-12-knot category. These speed groupings are weighted heavily by the aforementioned Kazbek tankers and bulk carriers in the Soviet fleet. The Satellite fleets in 1960, however, will have more vessels in the 15- and 16-knot categories than in any other. The world average for oceangoing vessels in 1957 was 12 knots. Ships presently under construction world-wide in the 12,000-to-15,000-DWT range of dry cargo ships generally provide speeds of 15 to 20 knots.

3. Age

Immediately apparent in the age distribution shown in Figure 3 is the amount of tonnage of 25 years of age and more -- one-fourth of total Bloc tonnage. Furthermore, about 331,000 gross register tons (GRT) under the Soviet flag fall in the 40-to-44-year group -- 11 percent of total Soviet tonnage and 7.5 percent of the

Bloc tonnage. These ships represent a definite weakness now, and the fleet plans for 1965-75 include plans for scrapping most of them. Improvement of the fleets already underway in this respect is indicated by the fact that in 1957 almost 60 percent of the Soviet fleet and 19 percent of the Polish fleet were age 25 years and over compared with estimated percentages in 1960 of 28 percent and 10 percent, respectively.

The group under 5 years, 41 percent of the Bloc fleets, is a result of the recent acquisition of newly built ships and the additions planned through 1960. By comparison, the world fleet at the end of 1957 contained 22 percent of total vessel tonnage in the under-5-year group and 15 percent in the 25-years-and-over group.

This brief survey of size, speed, and age characteristics of the Sino-Soviet Bloc fleets shows clearly that, although they compare favorably with world averages, they could not, under normal business practices, offer an effective competitive threat to the modern segments of Free World fleets. We shall take up shortly the Bloc-wide program for expansion of the fleet through 1975 and consider the effect these developments will have on the fleet's competitive position.

C. Fleet Operations

The three main groupings of Sino-Soviet Bloc fleets -- the Soviet fleet, the European Satellite fleets, and the Chinese fleet -- are engaged in quite different types of operation. The Soviet fleet is involved in both foreign and domestic coastal trade, while the Satellite fleets are engaged almost entirely in foreign trade and the Chinese fleet almost entirely in domestic coastal trade.

Although by far the greatest cargo movement handled by the Soviet fleet is in domestic coastal trade, more than one-half its vessel tonnage is engaged in foreign trade. The fleet operates in and from five main basins, the Black Sea - Azov, the Baltic Sea, the Far East, the Northern Basin (Barents Sea - White Sea), and the Caspian Sea.* Coastal operations take place within each of these basins as well as along the Northern Sea Route, and intercoastal operations take place between the basins except, of course, the Caspian.

Soviet vessels engaged in foreign trade are turning up on almost all major world trade routes except Oceania, South and East

* The Caspian fleet has been excluded from Soviet fleet figures. It amounts to roughly 500,000 DWT and is considered to be in the same category as the Great Lakes vessels.

Africa, the West Coast of South America, and the US. Some of the more important routes are the following:

Baltic	- North Sea and Atlantic Europe - North Africa - South and Southeast Asia - South America, Gulf, and Canada
Northern Basin	- Baltic, Atlantic Europe, and Mediterranean
Black Sea	- Mediterranean - Continental Europe - South and Southeast Asia - Far East - West Africa
Far East	- South and Southeast Asia - Canada - Atlantic Europe

The heaviest movements in this trade are general cargo, coal, timber, and grain in the Baltic/North Sea/Atlantic Europe area; crude oil and petroleum products from the Black Sea to Europe, South America, North Africa, and to a lesser extent the Far East; timber and apatite from the Northern Basin to Atlantic Europe; ores within the Black Sea and from the Black Sea to Europe; and general cargo and iron ore as well as other raw materials between the Black Sea and the Mediterranean, South, and Southeast Asia areas.

Since the widely scattered Soviet basins provide sea contact with nearby foreign areas, a major portion of Soviet vessel movement is in medium- or short-haul ranges. The repeated movement of exports from areas to which no significant imports are carried will also be noticed. This trend seems to be growing, with the result that Soviet ships are tending more and more to return in ballast. Efforts are being made to obtain more foreign interport cargoes to reduce the number of these return trips in ballast.

It is only in its domestic coastal trade that the Soviet fleet operates to any large extent in scheduled service. Less than 9 percent of the approximately 1.8 million DWT used either part or full time in foreign and intercoastal trade are on scheduled runs. The major international scheduled runs are from the Black Sea to the Mediterranean, to South and Southeast Asia, and to the Far East; from the Baltic Sea to Atlantic Europe and to the UAR; and from the Far East to Japan and to Southeast Asia. The largest tonnage maintained on any one route is about 48,000 DWT on the Black Sea - India line.

Poland is the only Satellite country which currently has the fleet necessary to engage in wide operations. Its fleet covers about the same areas as the Soviet fleet, but, in contrast, almost 75 percent of the Polish vessel tonnage is maintained on regular schedules. Principal scheduled runs are between Poland and the Far East, South Asia, South America, the Mediterranean, Scandinavia, and Atlantic Europe. The Far East line and the South America line are almost entirely scheduled service. Tramp vessels, which make up about 25 percent of the fleet tonnage, ply mainly in the Baltic, along the European coast, and to the Mediterranean and Black Sea.

Although the South Asia and Far East lines employ the largest portion of the fleet -- almost 300,000 DWT -- Polish ships move more cargo tons in the Baltic and in Atlantic Europe because of the shorter lengths of haul. Of the 4 million tons moved by Polish ships in 1958, almost 1.4 million tons were moved in the Baltic, most of which moved on tramp ships. Along the European coast, Polish ships moved about 850,000 tons, more than half on scheduled ships. On the South Asia and Far East lines, about 700,000 tons were carried, and on the Mediterranean and Black Sea routes about 550,000 tons. The South America line handled over 300,000 tons.

The preponderance of cargo carried on the medium and long hauls by the Polish fleet raises its average length of haul to about 2,600 nautical miles compared with an estimated average haul of about 1,800 miles for Soviet ships carrying foreign trade.

Among the other Satellite fleets, the older and smaller East German ships are operating in the nearby European range and the newer 10,000-tonners in the Far East trade. The Czechoslovak fleet is assigned exclusively to the Far East run. Two of the Rumanian ships have made runs east of the Suez Canal, but generally all ships operate in the Black Sea, in the Mediterranean, and occasionally in Europe and the Baltic areas, as do the Bulgarian ships. The Hungarian and Albanian ships operate exclusively in the Mediterranean and the Black Sea.

The Chinese fleet is confined to domestic coastal traffic, with the exception of a very small volume of goods carried from China to Hong Kong, North Vietnam, and North Korea. Chinese Nationalist success in denying the Chinese Communists the use of the Formosa Strait has forced the operations of the Chinese fleet to be divided into two separate areas. As a result of this division, Chinese Communist vessels operate on either the north or south coast but not between the coasts.

The greater part of the Chinese fleet is engaged in tramp-type operations, with only about 25 percent on liner service. Although some increase in liner operations may be expected in the foreseeable future, unscheduled runs will continue to utilize from 50 to 70 percent of the fleet's capacity.

The average length of haul of the Chinese fleet is estimated to be only about 460 nautical miles and will probably remain at this level unless the Formosa Strait is open to Chinese Communist shipping or until the Chinese Communist flag becomes more active in international trade. When China begins to carry goods to Southeast Asian countries, hauls of more than 2,000 nautical miles will not be uncommon, and even longer hauls may occur.

D. Vessel Acquisitions

Between 1960 and 1975 the greatest volume of vessel acquisitions will be in the Soviet fleet -- almost 8 million DWT of acquisitions, including over 1 million DWT to replace retired ships. Communist China is expected to add over 2 million DWT to its fleet, with no provision for scrapping old vessels. The Chinese are expected to use the older ships until they sink. Whatever losses are sustained by this

practice will be balanced by the constant process of salvaging vessels sunk in and around China waters since the beginning of hostilities in 1939. The Satellite fleets are expected to acquire almost 3 million DWT plus an additional 80,000 DWT or more to allow for scrappings.

Although the Chinese, starting from relatively low tonnage in 1960, will probably have the most modern single fleet by 1975, the Soviet fleet, because of its size, will influence most heavily the characteristics of the combined fleets of the Sino-Soviet Bloc.

1. Soviet Acquisitions

The USSR has added nearly 2.0 million DWT of new ships to its maritime fleet since World War II. The effect of these additions on the operating characteristics of the fleet has been slight because the ships added were smaller, slower, and in other respects less up to date than the ships which the Free World countries were adding to their fleets. With one exception, all of the tankers larger than 5,000 DWT which the USSR added to its fleet belonged to the Kazbek class. These tankers, which carry up to 11,000 metric tons at speeds of 12 knots, are both slower and smaller than the World War II T-2 tankers which are themselves outmoded. The USSR added no new dry cargo ships

larger than 8,000 DWT, and only a few of the smaller vessels had speeds and other characteristics which made them comparable to equivalent Free World vessels.

The years 1958 and 1959 mark a turning point in the character of Soviet fleet acquisitions. In 1958 the Soviet fleet received 2 diesel dry cargo ships of 10,000 DWT with speeds of 17 knots. These were the B-54 class, built in Poland. They are to be followed by similar ships built in both Polish and Danish yards. In 1959 the USSR is to receive the first series-built ships of two important new classes -- a steam turbine tanker of 29,000 DWT with a speed of 17.7 knots, and a steam turbine dry cargo ship of 13,000 DWT with a speed of 18.6 knots. Ships of the latter class have such up-to-date features as mechanical hatch covers and unstayed bi-pod masts. Both the tankers and the dry cargo ships will have air-conditioned one- and two-man rooms for the crews. These same features appear in many of the smaller types of ships which the USSR is currently planning to add to its fleet. Other modern features contemplated for some of these smaller types are shipboard cranes and variable-pitch propellers. The ships which the USSR plans to add to its fleet include 15 distinct types of dry cargo ships and 5 distinct types of tankers. Half of these types represent ships which

were still in the planning or early construction stages at the end of 1958.

The Soviet maritime fleet will receive new vessels at a rate averaging close to 500,000 DWT per year from 1960 to 1975. Approximately 25 percent of the tonnage will be tankers. This acquisition rate will be offset in part by a retirement and loss rate estimated at close to 80,000 DWT per year. The qualitative effects of this expansion will include a drop in the average age of the vessels from 14.1 to 11.6 years, a rise in the average speed from 11.6 to 14.9 knots, and a rise in the average size from 5,300 to 7,000 DWT.

2. Chinese Communist Acquisitions

Chinese acquisitions of vessels generally follow the world trend toward larger and faster vessels. Thus far there has been no evidence of any immediate intention to acquire bulk carriers, although much of China's trade could be handled effectively by this type of vessel. Tankers of the 20,000-to-30,000 class are projected and will probably appear in the fleet by 1967. It is anticipated that in 1975 the division between tankers and dry cargo vessels will be approximately the same as at the present time and that the dry cargo group will certainly include refrigerator ships and possibly bulk carriers as well.

By 1963, Chinese shipyards will be turning out annually 100,000 GRT of oceangoing vessels, and by 1975 this figure will have risen to more than 150,000 GRT. It is likely, therefore, that the bulk of the additions to the Chinese fleet will come from domestic yards. It is estimated that Communist China will add to its fleet domestically constructed vessels of 1,000 GRT and larger at a rate increasing from 27,000 GRT per year in 1959 to 116,000 GRT per year in 1975. Although acquisitions from foreign sources totaled more than 150,000 GRT in 1957-58, these imports will decline in importance as domestic shipbuilding expands. It would seem likely that the Chinese Communists will purchase at least 300,000 GRT from non-Chinese sources, with the bulk of such purchases occurring in the next 5 years.

This rapid acquisition of new vessels will give China a relatively modern fleet, having speeds in excess of 12 knots. Since about 50 percent of the fleet will be engaged in coastal operations, about half of the fleet will probably be less than 10,000 GRT, while the other half will probably include vessels of up to 20,000 GRT. Fast cargo vessels of 11,000 GRT, comparable to the US Mariner class, are under construction and will soon be in operation. Plans for tankers of 20,000 GRT are on the drawing boards, and construction will probably begin on these

vessels in the next year or two. The most important fact indicated by Chinese Communist plans and present trends is that in 1975 the Chinese merchant marine will have increased almost fivefold over 1958, to almost 3 million DWT, nearly two-thirds of which will be less than 10 years old.

3. Satellite Acquisitions

Most of the increases in the Satellite fleets are planned to be new vessels built in Satellite yards. A few will be built in Japanese yards (Czechoslovakia already has one 12,500-DWT dry cargo ship under construction at Asaka), several in Yugoslav yards (present orders include 12,500-DWT dry cargo ships and 20,000-DWT tankers), and some Kazbek-class tankers built in the USSR for East Germany. The largest suppliers will be Poland and East Germany, both of which will be reserving most of the larger ships for their own fleets and supplying the other Satellites with ships of 5,000 DWT and under. Figure 4 shows five of these larger ships. By 1965, Poland should have in its fleet at least 8 of the 18,000-DWT tankers, and 10 more should be added by 1975. Poland should also have at least 3 of the 35,000-DWT diesel tankers by 1975. The 35,000-DWT nuclear tanker is an unknown factor. It is certainly being planned, with construction expected by 1970. East

German tankers acquired by 1975 are likely to be in the Kazbek class and therefore are not as modern as could be desired. Some of the 90,000 DWT of tankers to be added in the 1965-75 period, however, may be the Polish-built 18,000-tonners, which are comparatively modern vessels. The Czechoslovak and Rumanian tankers are most likely to be Yugoslav built.

At least 30 of the 10,000-DWT dry cargo ships shown on Figure 4 as being built in Polish and East German yards are for the East German fleet. In addition to those shown on the chart, the Polish yards will be building a series of diesel-propelled bulk carriers of 12,500 DWT (as a shelter-decker) and 14.5-knot speed, of which at least 40 may be added to the Polish fleet by 1975.

A group of general cargo ships of 6,000 DWT and 15-knot speed (series B-55) are being turned out, three of which have already been assigned to the Poland-US run. There should be about 10 or 12 of these in the 1975 fleet. Another group of general cargo ships of either 8,000 DWT or 9,300 DWT, with speeds of 15 to 16 knots, is planned for construction in Yugoslav yards and possibly also in Polish yards, to be assigned to the South America and Mediterranean runs. Speeds on these should be about 15 to 16 knots, and there should be about 20 such ships in the fleet by 1975.

East Germany is also building 7,000-DWT colliers and 3,500-DWT general cargo ships, both of 14-knot speeds, some of which may come into the East German fleet. Several of the 3,500-tonners are destined for Albania, Bulgaria, and possibly Rumania.

The period of heaviest acquisition for the Polish fleet will be between 1960 and 1965, as Poland makes an effort to meet a deteriorating foreign exchange situation caused in part by its reliance on foreign shipping. About 720,000 DWT will be added during that period. From 1965 to 1975 the acquisition rate will decline to about 250,000 DWT for each 5-year period. All of the other Satellites will apparently maintain a more or less steady acquisition rate, totaling 500,000 DWT in the 1960-65 period and about 450,000 DWT for each 5-year period between 1965 and 1975.

By 1975 the average size of vessels in the Polish fleet will have increased from about 5,300 DWT in 1958 to about 8,000 DWT. Average speeds will have increased from about 12.6 knots in 1958 to about 14 knots in 1975. In 1975 the average age of the fleet will probably be about 12.5 years, and 34 percent of the fleet will be in the 10-years-and-under age group.

The rest of the Satellites will have a greater percentage of ships in the 10-years-and-under age group, and average sizes and speeds will probably be greater than in the Polish fleet. Speeds may average around 15 knots.

4. Summary

By 1975 these acquisitions should result in a total Bloc fleet with good competitive capabilities. The relatively large acquisitions in the 1960-65 period will put the Bloc fleet in its best competitive position in 1965, although it will not be as large a fleet as in 1975. At the end of 1965, about half of the total Bloc tonnage will be under 5 years of age, and the new vessels will be generally modern in design. The average ages will be about 8 years in the Satellite fleets and about 11.5 years in the Chinese and Soviet fleets. The year 1975 should find the Bloc fleets still competitive, as about 2.2 million DWT will be under 5 years of age, about 12 percent of total tonnage. The average age in 1975 of the combined Bloc fleets should be between 11 and 12 years, and the average speed about 14.5 knots.

II. Performance of the Sino-Soviet Bloc Maritime Fleet, 1950-75

Figure 5 shows our estimates of the cargo carried in domestic and international trade in 1950-75 by Sino-Soviet Bloc merchant fleets. For each fleet the figures for 1965-75 have been weighted by expected average lengths of haul. Performances of the Chinese and Soviet fleets are much higher compared with sizes of the fleets than are the Satellite performances because of the heavy preponderance of domestic cargo, which, with its very low average lengths of haul, will enable more cargo to be carried per vessel per year.

These estimates indicate that by 1965 the Sino-Soviet Bloc fleets will be carrying 89 percent more cargo than in 1958 and 60 percent more cargo than in 1960. By 1975 they will carry three times the amount of cargo carried in 1958, two and one-half times the amount carried in 1960, and 66 percent more than in 1965. As the fleets expand and more Bloc ships are placed in international trade, the proportion of domestic cargo to total cargo carried will be decreasing from an estimated 70 percent in 1958 to about 49 percent in 1975. Conversely, the proportion of foreign trade cargo to total cargo carried will be increasing from 30 percent in 1958 to about 51 percent in 1975.

On the face of it, this shift in type of cargo carried would seem to mean that the amount of vessel tonnage assigned to carry foreign trade would increase more than the vessel tonnage assigned to domestic trade. The fact is, however, that the domestic cargo carried is estimated to increase about 120 percent between 1958 and 1975, and the size of the fleet assigned to carry domestic cargo may increase proportionately (from a little over 2 million DWT in 1958 to almost 5 million DWT in 1975, excluding the Caspian fleet). The cargo carried in international trade, on the other hand, is estimated to increase 440 percent (from 27 million tons in 1958 to 145 million tons in 1975), while the vessel tonnage assigned to carry the international trade may increase only about 380 percent (from about 3 million DWT to almost 13 million DWT). The reason for this seeming disparity lies largely in comparative lengths of haul and in vessel speeds. Neither the lengths of haul (460 miles in Chinese trade and about 380 miles in Soviet trade) nor the speeds of vessels in the coastal trades are expected to change much by 1975. Average lengths of haul in international trade, however, are expected to decrease from 1958 to 1975. In 1958, cargo carried in international trade by Satellite ships (which averaged from 2,500 miles

for Polish ships to 9,500 miles for Czechoslovak ships) made up 20 percent of total international trade carried by all Bloc fleets. The other 80 percent, all in Soviet ships, averaged only about 1,800 miles in length of haul. In 1975, however, cargo in international trade carried by Satellite fleets will account for only 16 percent of the total international trade carried by all Bloc fleets. Furthermore, the Soviet average length of haul in international trade in 1975 is expected to decrease to 1,700 nautical miles, and the Chinese average length of haul may not be any higher than 1,500. Therefore, the average length of haul for cargo carried in international trade by the entire Bloc fleet is expected to decrease, which will allow vessels to carry more cargo per year. In general, the speeds of vessels in foreign trade are also expected to average higher, which also allows quicker turn-around time and more cargo handled.

In Figure 6 the performance of the Bloc fleets is compared with the amount of world international seaborne trade. The significant figures here are the percentages that Bloc movements of international trade cargo represent in total world movements. Although the share, only 2.4 percent in 1958, is constantly increasing, by 1975 it will still

be only 9 percent at the most. Our estimate of world trade, as pointed out previously, was made deliberately low because of the trend toward regional trading areas. If world trade should be greater than we estimate, say about 2 billion metric tons, the share carried by Bloc fleets will be only 7.5 percent of total world trade. This figure represents a significant proportion of total world carriage but does not of itself indicate that the Bloc fleets will be a controlling factor in seaborne movement of world trade.

III. Seaborne Foreign Trade of the Sino-Soviet Bloc

A. Patterns of Seaborne Foreign Trade

1. USSR

Soviet seaborne foreign trade is characterized by a preponderance of exports, which in 1956 were twice the volume of import cargoes. Seaborne exports in Soviet ships increased by 100 percent in the year 1957 alone.

The seaborne trade of the USSR in the major bulk commodities is largely with South America, Western Europe, and the European Satellites. Some exceptions in this seaborne movement are exports of Soviet crude oil and petroleum products to Egypt; exports of coal and crude oil and petroleum products to Communist China; and a limited movement of Soviet coal, timber, and crude oil to Japan. The increasing seaborne trade of the USSR with the underdeveloped nations of the world consists to a large extent of manufactured goods which fall into the category of general cargo.

In order of magnitude the five most important commodities involved in Soviet seaborne foreign trade are the following: crude oil and petroleum products, coal, timber, ores, and apatite. Crude oil, petroleum products, and coal are important as both exports and imports;

the others only as exports. The volumes of these cargoes exported in Soviet ships are planned to increase by the following percentages between 1958 and 1965: timber, 400 percent; coal, almost 300 percent; ores, 200 percent; crude oil and petroleum products, 200 percent; and apatite, 100 percent. This reflects the planned increase of 183 percent in the volume of foreign trade cargoes carried by Soviet ships. The volume carried in foreign ships is planned to rise by only 9 percent during the same period.

There are no indications at present that these tremendous increases in volume will affect significantly the pattern of Soviet seaborne trade through 1975.

2. Communist China

The volume of Communist China's foreign trade is about evenly divided between seaborne and overland shipments. Trade with the Free World is carried predominantly by sea, while the major portion of trade with the Bloc moves overland. The volume of China's seaborne imports is estimated to be about one-half the volume of its exports, or 3.6 million tons in 1958. Most of China's seaborne import trade in 1958 was with Western Europe. While its seaborne exports went mostly to Hong Kong and other nearby South East Asian countries, about 2.5 million tons were shipped to the European Satellites. Agricultural products and minerals dominated the exports, with most

mineral and chemical exports going to the European Satellites. Imports consisted largely of industrial raw materials and capital equipment.

It is likely that the ratio of exports to imports (2 to 1) will decline slightly in the foreseeable future. China will undoubtedly try to increase its exports of consumer goods and manufactured items, which will probably expand relative to agricultural products and minerals. However, these latter items will continue to dominate the export picture for the predictable future and the period under discussion. Little change is anticipated in the existing pattern of trade areas, but there may be some decline in imports of bulk items such as chemical fertilizers.

3. European Satellites

Polish seaborne foreign trade amounts to 33 percent of the volume of total Polish foreign trade. In 1958, 8.6 million tons were exported, of which 6.7 million tons were coal, and 5.1 million tons were imported, the largest single import cargo being iron ore, 1.7 million tons.

By far the heaviest movement of Polish seaborne foreign trade moves in the Baltic, 4.9 million tons (mostly iron ore and coal) out of the total of 13.7 million tons of total seaborne trade in 1958. The next largest area moves in the North and Norwegian Seas, 2.0 million tons. Atlantic Europe (France, Portugal, and Spain) accounted for another 1.1 million tons, bringing the amount of seaborne trade moving

in the nearby European area to 8 million tons, or 58 percent of total Polish seaborne trade. The next largest area in volume is South and Central America, accounting in 1958 for 1.4 million tons, followed by North America with 1.3 million tons -- mostly US trade agreement grains. Trade with Mediterranean countries amounted to 1.2 million tons, imports from the Black Sea (mostly crude oil and petroleum products) came to 579,000 tons, and trade with West Africa to 376,000 tons (mostly phosphate imports). In terms of volume, Asia is relatively insignificant -- 252,000 tons with South Asia, 73,000 tons with Southeast Asia, and 333,000 tons with the Far East, in all only 658,000 tons with areas east of the Suez.

In the foreseeable future, increases are expected to maintain about the same area proportions, with South American trade possibly growing in proportion and North American trade decreasing.

In 1958, East German seaborne trade (5.5 million tons) and Czechoslovak seaborne trade (4 million tons) were both about 20 percent of each country's total foreign trade. However, whereas 34 percent of East German seaborne trade moved in the Baltic in 1958 (1.9 million tons), only about 20 percent (835,000 tons) of Czechoslovak trade moved in the Baltic. Both Czechoslovakia and East Germany moved about 500,000 to 550,000 tons each in trade with South Asia. East German

trade in 1958 was about 1 million tons, and Czechoslovak trade with China probably ran between 500,000 and 600,000 tons. While East German trade with South America is still small, around 160,000 tons, Czechoslovak trade with South America is in the neighborhood of 400,000 to 450,000 tons. East German seaborne trade with the Mediterranean countries, including Egypt, ran about 300,000 tons in 1958, and there was a further movement of about 500,000 tons from the Black Sea. Czechoslovak trade with the Mediterranean and east of the Suez is beginning to move more and more through the Black Sea rather than through West European and Polish ports.

Rumanian traffic is largely in two areas -- in the Black Sea and the Mediterranean, and between the Black Sea and Europe -- with only an insignificant movement to and from the Far East. Hungarian, Bulgarian, and Albanian seaborne foreign trade is relatively insignificant and is largely in the Black Sea and the Mediterranean, although Hungary's trade with the Asian area is growing.

The heaviest trades for the Bloc in general, therefore, are the local traffic in the Baltic and Atlantic Europe area first, then Europe and the Baltic to and from the Mediterranean and the Black Sea. The local China -- Southeast Asia trade is apparently fairly

heavy. The Far East and South Asia trade with Europe and the Europe and Black Sea trade with South America may be about equally heavy.

Traffic patterns in 1975 show no signs of any great change except perhaps growing traffic in the Europe - Near and Middle East trade, the China - South Asia trade, and the Europe - South America trade. Traffic in all other trades may be expected to grow in their present proportions as Bloc seaborne trade grows.

B. Adequacy of the Bloc Merchant Marine

In 1958 the seaborne foreign trade (imports and exports) of the Sino-Soviet Bloc was 58 million tons. Of this amount, only 32 percent, about 19 million tons, were carried in Bloc vessels, the remaining 68 percent being transported by Free World shipping. If one-half of the Bloc carryings of foreign interport cargo is cargo carried between other Bloc ports, then the cargo left for carriage by Free World vessels is 35 million tons, or 60 percent of all Bloc seaborne foreign trade. In other words, the Bloc is presently dependent on the West for the transport of almost two-thirds of its seaborne imports and exports.

It is estimated that a minimum average of approximately 3.2 million DWT of foreign vessel tonnage is needed at present to carry Sino-Soviet Bloc trade, and as much as 4.5 million DWT when the use of liner services is taken into account. Such a situation not only is a matter of concern to the Bloc nations in their struggle for increasing prestige and Bloc self-sufficiency but also represents a serious drain on their foreign exchange to pay for their service by foreign vessels.

It is estimated that in 1965 the total seaborne foreign trade of the Bloc will be 93 million tons, of which Bloc vessels will carry a minimum of 60.5 million tons or possibly 71 million tons if, again, one-half of the foreign interport carryings is intra-Bloc cargo. This will leave from 22 million to 32 million tons, to be carried by foreign vessels. The foreign vessel tonnage required would probably range from 2.0 million DWT to 3.0 million DWT without allowing for use of liner services.

In 1975 the share of the total foreign trade of the Bloc carried in its own vessels will probably be from three-fourths to nine-tenths, indicating virtual nondependence on Western maritime services. Total Bloc seaborne trade, however, will also have risen during this period, and there will still be from 15 million to 34 million tons to be carried

in Western vessels. The foreign tonnage required would be between 1.5 million DWT and 3.5 million DWT.

So far as can be seen, the Bloc fleets, with the exception of the Chinese fleet, will be adequate to carry their own domestic coastal and intercoastal trade. At present, foreign vessels are important to Chinese coastal trade, however, where their primary use is to bridge the gap in the operations of the Chinese fleet created by the Nationalist control of the Formosa Strait.

The trend since 1950 has been for greater self-sufficiency and less dependence on foreign (particularly non-Bloc) vessels. Considerable progress has been made toward achieving this objective, and by 1975 the goal should virtually be realized, although some non-Bloc vessels will still be utilized in international shipments. By the end of the period covered in this analysis, Bloc dependence on Free World shipping will be very slight.

IV. Potential of the Bloc Maritime Fleet as a Competitor to the Free World

A. Status of Bloc Shipbuilding Industry

After World War II the shipbuilding industry in the USSR and the European Satellites underwent extensive expansion and modernization.

During the immediate postwar period the USSR sought to build up rapidly its naval and merchant fleets. Because the shipbuilding industry in the USSR and particularly in the European Satellites was not fully developed by the early 1950's and most of the principal shipyards in the USSR were loaded heavily with naval vessel construction, the USSR turned to the shipbuilding countries of Western Europe for much of its new merchant tonnage. Upon the completion of the major part of the naval vessel construction program in about 1955-56, the shipyards of the USSR turned to producing merchant tonnage, and as the shipbuilding facilities of the European Satellites had been expanded greatly, fewer shipbuilding orders were placed with Western European countries.

The peak production year in the USSR was 1955, when it produced over 190,000 standard displacement tons of naval construction and nearly 100,000 GRT of oceangoing merchant vessels. The European Satellites and Communist China in 1958 produced a total of 260,000 GRT

of oceangoing merchant vessels. These production figures represent a rate of output at the most economical production level. Increased employment and multiple shift work, together with proper priorities, undoubtedly could increase these figures materially. It is believed that sufficient capacity exists in the Sino-Soviet Bloc to meet its shipbuilding requirements for naval and merchant tonnage.

The shipyards of the USSR range in technical development from very advanced to most primitive. The larger yards such as the Baltic and Admiralty shipyards in Leningrad and the Nosenko yard in Nikolayev are in some respects more advanced than those in Western Europe and the US. In welding techniques and weld testing equipment, the shipbuilding industry of the USSR is equal to the Free World. In many respects, however, the industry fails to meet Western standards.

Photolofting and automatic gas cutting of hull plates are now rather widely used practices in the major shipyards of Western Europe. The result is a considerable saving in labor and building time over the former method of handmarking and hand flame cutting and shearing. The USSR planned to install this new system by 1961 in all major shipyards. It was installed in three shipyards in 1956, 22 more were to

receive the installation in 1957, and 80 units were to be in use by the end of 1960.

With the advent of welded hulls it became possible to assemble sections or blocks of a ship in a subassembly area and then to move this block to a building way. This block method of assembly saves considerable way time and over-all building time and is limited only by the weight-handling facilities in the yard. At the present time, the USSR perhaps leads the world in this method of ship assembly.

Serial or assembly-line construction of ships has been developed to a greater extent in the USSR than any other country. Although this practice should reduce materially over-all building time and costs, these advances are probably more than offset by lower labor productivity, particularly in fitting out and finishing. Also, certain design practices in the USSR are highly inefficient, which makes the design quite expensive in both over-all time and designer man-hours. Consequently, building time and labor costs do not compare advantageously with single ship construction in the better Western yards.

To guide the development of the shipbuilding industry, considerable attention was given to the establishment and expansion of research and development institutes, model testing facilities, design bureaus, and institutes for the training of naval architects and marine engineers as well as other engineering professions.

B. Shipping Services to the Free World

The most obvious service to the Free World by Bloc ships would seem to be that traffic shown in Figure 5 as "between foreign ports." Of the 815,000 metric tons carried in 1958 by Satellite ships between foreign ports, probably more than two-thirds was really between Western ports, but of the 7.5 million tons carried by Soviet ships, less than half was carried between Western ports, making a total in 1958 of only about 3 million tons of strictly Western cargoes carried in Bloc ships in 1958, less than one-half of 1 percent of the 1 billion tons moved in total Western seaborne trade. Because all Bloc countries are interested in earning hard-currency foreign exchange, for which maritime carryings of Western trade are a good source, this proportion of total cargo carried between foreign ports is likely, in the normal course of events, to be maintained. If so,

Bloc ships should by 1965 carry about 8 million tons out of an estimated total of about 1.2 billion tons of Western seaborne trade, still less than 1 percent. In 1975, purely Western cargoes carried would be only about 14 million tons, also still less than 1 percent of total Western trade. There are, of course, possibilities that Bloc ships will purposely increase this type of carrying, which will be mentioned later.

The only other service by Bloc vessels to the Free World is their carriage of Bloc exports to the Free World, which in a sense is a service to the Bloc as well. In 1958, the Soviet merchant fleet carried an estimated 9 million tons of Soviet exports, of which probably only 5 million to 6 million tons were carried to Western countries. Satellite ships carried only about 2 million tons to the West, making a total of only about 7 million to 8 million tons, which is still a rather negligible service to the Free World in terms of total world trade. By 1975, however, exports carried to the West may be as much as 35 million to 40 million tons which, combined with possible Western interport cargo, would amount to 45 million to 50 million tons. Nevertheless, this is still only 2 to 3 percent of total estimated world trade.

C. Effects of Diversion of Seaborne Traffic to Overland Carriers

In view of the mounting volumes of domestic coastal and intercoastal cargo carried by Bloc ships, as was seen in Figure 5 (68 million tons in 1960, growing to over 140 million tons in 1975), there must be considered the possibility of the Bloc countries attempting to divert this cargo to overland routes and use the fleet tonnage so released to compete in international trade.

In 1957, Soviet transportation writers who had been advocating a shift of cargoes from the railroads to less costly maritime coastal and river shipping began to advocate instead a shift of cargoes from maritime coastal and intercoastal shipping to river and mixed rail-and-river shipment. The justification for this shift was the need to free vessels in coastal operation for use in the carrying of Soviet seaborne foreign trade. Two of the specific changes recommended were the substitution of inland water movement of apatite ore and pulpwood via the White Sea - Baltic Inland Waterway instead of the sea movement of these cargoes from the White Sea, around Norway, and back to the USSR via the Baltic, and the substitution of mixed rail-and-river movement of cargoes for the maritime coastal movement of cargoes from Murmansk and Arkhangel'sk to ports along the Northern Sea Route.

One apparent effect of this policy change is the complete halt in the intercoastal movement of petroleum products from the Black Sea to the Soviet Far East in 1958. Another is the leveling off in the volume of coastal shipments. These shipments are planned to increase by only 17 percent between 1955 and 1960, whereas foreign trade shipments are planned to increase by 163 percent.

Actually, there are a number of factors tending to limit the extent to which Soviet coastal tonnage can be released for the carrying of seaborne foreign trade. In the area along the Northern Sea Route and at many points in the Soviet Far East, the only access is by sea. The ships serving these areas cannot be pulled off. In these and other areas the ships engaged in coastal shipping include many which because of their mechanical condition, size, or other characteristics cannot be used elsewhere. Many of the block of ships in the fleet which will be at least 40 years old at the end of 1960, totaling 470,000 DWT, fall into this category. There are even ships among the new types planned for the fleet which will be limited by size and other factors to coastal operation. At best, by 1975 probably not even 2 million DWT could be released to foreign trade.

Satellite coastal trade is in any event negligible and engages very small amounts of fleet tonnage.

The past few years have seen the Chinese using foreign bottoms as well as all of their own fleet to carry their coastal shipping, but there is a possibility that Chinese railroads can eventually absorb enough coastal traffic to release Chinese oceangoing ships for international trade. The diversion of the goods moved by the coastal fleet to overland transportation would at the present time add to the problems which already plague the Chinese transport system. It is estimated that in 1958 some 30 million to 40 million tons of goods scheduled to be moved by the railroads were still awaiting transportation at the end of the year. The addition of the 14 million tons moved by coastal maritime transport would, however, be only a 4-percent increase over the 380 million tons actually moved by the railroads. Considering anticipated railroad construction and highway development, it seems likely that, even if all of the 48 million tons predicted for movement by coastal shipping in 1975 were diverted to overland transport, the overland system would feel only slight effects from the increase. If this were accomplished, it would presumably release some 1.5 million DWT for addition to the foreign trade fleet in 1975.

With the presently estimated fleet expansion of the Bloc, therefore, in 1975 less than 3.5 million DWT of Bloc ships could be added by releasing ships in domestic trade to the estimated 13 million DWT already to be used in 1975 in foreign trade, an increase of tonnage amounting to only about 1.5 percent in terms of the total world oceangoing fleet in 1975.

D. Other Means of Bloc Competition with Free World Maritime Fleets

1. Use of Free World Shipping to Release Bloc Shipping

There is always the possibility that the Sino-Soviet Bloc could or would use its fleets as instruments of economic warfare rather than primarily as national services. If such a policy were carried to the extreme, it is conceivable that the Bloc would engage foreign ships to carry its own import-export trade and would use its present foreign trade fleet of approximately 3 million DWT and its estimated 1975 foreign trade fleet of about 13 million DWT to compete against Free World vessels for Free World cargoes. The over-all effect on world shipping would be negligible, as Western vessels would still be carrying the same total amount of cargo. However, the piecemeal disruptive effects could be rather severe, not only by 1975 but at present. Although

Polish ships are mainly on scheduled runs and, at least under present conditions, would probably not be pulled off those runs. Soviet ships are mainly in tramp service. A change in Soviet policy from economic motivations (mainly earning and saving foreign exchange) to political motivations could allow placing their ships, about 2 million DWT by 1960, into almost any desired trade route.

The use of rate undercutting could overcome any characteristics of Soviet vessels which are inferior to those of the modern segments of the world fleet. The tactics could be to select a certain trade route or routes and to place enough appropriate shipping into the run to blanket sailings of scheduled lines, and to offer inducement rates. Engaging in such tactics would undoubtedly cut down the amount of cargo carried per deadweight ton, but the estimated 58 million tons of cargo carried in 1965 and the 107 million tons in 1975 which will be carried by the USSR under normal practices give an indication of the magnitude of the impact which such tactics could achieve in selected trades.

The contemplated Chinese Communist fleet, with about 1.5 million DWT in foreign trade in 1975 carrying about 12 million

cargo tons, will pose a serious competitive factor to shipping operators in the Far East in any event, without any purposeful diversion of ships to blanketing specific trades. Already some of the considerable fleet of Western ships (about 1 million DWT) under charter to China have been released from Chinese coastal operations and are being used as a rate-cutting instrument in Chinese foreign trade. Many conference lines are already finding no Chinese cargo available.

A deterrent to such moves at present by the Soviet and Polish fleets is the fact that the USSR joined the Baltic and International Maritime Conference about a year ago. The Polish fleet has a working agreement not only with the Baltic Conference but also with the Madras and Pondicherry Continental Conference and is contemplating other such agreements. Membership in such international conferences would indicate a determination to utilize their maritime fleets for the economic purposes of obtaining foreign exchange earnings, or savings, rather than as political instruments.

The effectiveness of Bloc efforts to disrupt Western shipping could be circumvented successfully by concerted efforts on the part of Western shipping conferences and by other countermeasures taken by Free World governments.

2. Economic Penetration

The Bloc fleets can be used to service the underdeveloped nations as a form of economic penetration. This in fact is already being done. Scheduled lines are expanding to make regular calls at Near East and Southeast Asian ports as well as South American ports. Shipping agreements are being entered into between Bloc and non-Bloc nations. For example, the USSR has already entered into agreements with Egypt, India, and Japan, whereby a specified number of ships of each nation will run regular services between the two nations concerned. The same type of agreement holds between Poland and India (although India has not yet supplied its share of the ships) and between East Germany and Egypt. More of these agreements can be expected, with the resulting trend toward monopolizing certain trades.

Technical assistance is also being offered by the Bloc maritime industries to underdeveloped nations which are attempting to build their own fleets. The first large-scale example is Soviet and Polish activities in Indonesia. About 60 Soviet merchant marine officers and radio operators are training indigenous personnel for eventual manning of the 12 vessels turned over to Indonesia by the USSR.

Ninety Polish marine officers are presently operating Indonesian ships in their inter-island trade, training personnel, and working in the administrative organization of the Indonesian merchant marine. Polish personnel are also involved in shipyard construction.

The USSR has granted a $5 million loan to Indonesia for the construction of a merchant marine academy.

3. Bloc Unification Efforts

The two organizations best known and most effective within the Bloc for their Bloc unification efforts are the Council for Mutual Economic Assistance (CEMA) and the Chinese-Polish Shipbrokers Corporation (Chipolbrok).

A joint maritime organization is reportedly being planned under the auspices of the Committee on Transportation of CEMA. The purpose of this organization will be to coordinate the maritime activities of the Bloc merchant fleets. Of greatest interest is CEMA's expressed intention to coordinate the efforts of all Bloc fleets, to indicate sea routes which will be established by the various fleets, to arrange exchanges of ships on reciprocal loans, and even to have control over new construction in Satellite countries. The first meeting of

shipping directors of the various Bloc fleets took place in Bucharest in February of this year, although whether any steps forward were accomplished is open to question. It is of interest that, although CEMA members were in attendance as observers, this was not a CEMA meeting. There may be opposition to such a coordinating move, particularly from the Polish shipping companies, from the powerful Czechoslovak forwarding agent, and from the newly formed Czechoslovak shipping company. On the other hand, the long-continuing operation of Chipolbrok has set a precedent. Such a central control of Bloc fleets could present a very effective competitive front.

Chipolbrok was organized in the latter part of 1951, with head offices in Tientsen, China, and a branch office in Gdynia, Poland, to handle the traffic between European Bloc ports and Communist China. Chipolbrok operates ships on the China run, arranges forwarding and stevedoring services, provides certain brokerage facilities, and acts as fiscal agent for Chinese Communist crews. Of the 26 Polish flag ships on the Baltic-China run by the end of 1958, 18 were effectively controlled by the Chinese through Chipolbrok.

V. Evaluation of Bloc Shipping, 1975

The several developments outlined in this paper point to the Sino-Soviet Bloc fleets as emerging competitors to Free World maritime powers. By 1975 the Bloc fleets will have increased their capacity more than 3.5 times that of 1958 and will represent 8 percent of the total world fleet.

This situation contrasts with the present time, when the Bloc fleets, although comparing favorably with world fleet averages, are not truly effective economic competitors. By 1975, there will have been noticeable increases in the size of Bloc vessels, probably an average of 7,000 to 8,000 DWT. The average age of Bloc vessels will be 11 to 12 years, and 12 percent of the total tonnage will be under 5 years of age. The most modern single fleet will be that of the relative newcomer to world maritime circles, Communist China. These improvements in the characteristics of Bloc fleets will put them in good competitive positions vis à vis Free World maritime powers.

Other areas in which the Bloc position will have improved noticeably by 1975 will be its role in the carriage of international seaborne trade and its reduced reliance on Free World shipping. By 1975,

Bloc fleets will be carrying three times the cargo volume they carried in 1958. Over half of this cargo will be foreign trade cargo, and the Bloc's foreign trade fleet will have increased from about 3 million to 13 million DWT. Moreover, the Bloc share in carriage of seaborne international trade will have increased from a little over 2 percent in 1958 to about 9 percent in 1975. This is admittedly a significant share of the carriage in international trade, although it is, of course, not a controlling share.

Another important development is that, despite the fact that Bloc requirements for Free World shipping in 1975 will be about the same as in 1958, Bloc dependence on foreign shipping will be reduced substantially. In 1975, Bloc fleets will be carrying from 75 to 90 percent of their foreign trade in their own bottoms, compared with only 32 percent in 1958. Moreover, with the exception of China, all fleets will be adequate to carry their own domestic coastal and intercoastal trade.

It is apparent, therefore, that as present plans are implemented the Bloc will have been essentially successful in reaching its goal of maritime self-sufficiency.

On the basis of present trends, Bloc carriage of Western cargoes will reach about 14 million tons in 1975, less than 1 percent of total

Western trade. If we include Bloc carriage of its own exports to the Free World, the Bloc in 1975 will be carrying a total of about 45 million to 50 million tons, or 2 to 3 percent of total world trade.

These figures do not loom large in the framework of total world trade. But, with its anticipated 1975 fleet, there are several measures the Bloc could undertake to offer effective competition to Free World maritime powers.

Disruptive efforts by Bloc states could be damaging to Western shipping, particularly if the Bloc should follow deliberate market-breaking policies aimed against specific trade routes. A concentration of Bloc shipping on particular trade routes, combined with forced rate cutting, such as China is presently doing in the Far East, could be done with sufficient intensity to hurt Western shipping operators. The success of these efforts is doubtful, however, if Western shipping associations or governments use the effective countermeasures which would be at their disposal.

The Bloc has also embarked upon other measures which could make any competitive efforts on its part more effective. Among these is a decided trend toward the establishment of a centralized and unified Bloc shipping concert under CEMA. The Bloc, moreover, has already

undertaken some penetration activities, such as the expansion of scheduled lines to the Near East, to Southeast Asia, and to South America and the negotiation of shipping agreements as typified by Soviet agreements with Egypt, India, and Japan. Technical assistance is another device currently being used by the Bloc -- for example, the Soviet and Polish technical assistance teams now in Indonesia.

While the Bloc fleet in 1975 will not be an overwhelming force in maritime circles, it will definitely have the capacity in 1975 to offer on a selected basis very effective competition against Western shipping. Moreover, we may expect that it will be used effectively in close support of Communist international political and economic objectives.

STATISTICAL APPENDIX

Table 1

Estimated Growth of Sino-Soviet Bloc Fleets
Selected Years, 1950-75

Thousand Gross Register Tons (GRT) and Thousand Deadweight Tons (DWT)

Fleets	1950		1958		1960		1965		1975	
	GRT	DWT	GRT	DWT	GRT	DWT	GRT	DWT	GRT	DWT
Poland										
Tanker	7	10	34	52	75	113	170	250	340	500
Dry cargo	169	230	366	525	465	607	860	1,190	1,060	1,500
Total	176	240	400	577	540	720	1,030	1,440	1,400	2,000
East Germany										
Tanker	0	0	16	23	32	46	64	92	130	185
Dry cargo	0	0	65	97	144	224	236	358	400	615
Total	0	0	81	120	176	270	300	450	530	800
Bulgaria										
Tanker	0	0	0	0	0	0	0	0	0	0
Dry cargo	10	19	28	46	49	75	95	145	140	200
Total	10	19	28	46	49	75	95	145	140	200

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Table 1

Estimated Growth of Sino-Soviet Bloc Fleets
Selected Years, 1950-75
(Continued)

Thousand Gross Register Tons (GRT) and Thousand Deadweight Tons (DWT)

Fleets	1950		1958		1960		1965		1975	
	GRT	DWT	GRT	DWT	GRT	DWT	GRT	DWT	GRT	DWT
Czechoslovakia										
Tanker	0	0	0	0	13	20	13	20	40	60
Dry cargo	0	0	33	48	57	80	127	180	240	340
Total	0	0	33	48	70	100	140	200	280	400
Rumania										
Tanker	0	0	0	0	0	0	0	0	25	35
Dry cargo	21	30	23	32	44	61	150	210	295	410
Total	21	30	23	32	44	61	150	210	320	445
Hungary										
Tanker	0	0	0	0	0	0	0	0	0	0
Dry cargo	2	3	7	9	11	13	16	20	40	60
Total	2	3	7	9	11	13	16	20	40	60

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Table 1

Estimated Growth of Sino-Soviet Bloc Fleets
Selected Years, 1950-75
(Continued)

Thousand Gross Register Tons (GRT) and Thousand Deadweight Tons (DWT)

Fleets	1950		1958		1960		1965		1975	
	GRT	DWT	GRT	DWT	GRT	DWT	GRT	DWT	GRT	DWT
Albania										
Tanker	0	0	0	0	0	0	0	0	0	0
Dry cargo	0	0	0	0	10	13	19	25	35	50
Total	0	0	0	0	10	13	19	25	35	50
All Satellites										
Tanker	7	10	50	75	120	179	247	362	535	780
Dry cargo	202	282	522	757	780	1,073	1,503	2,128	2,210	3,175
Total	209	292	572	832	900	1,252	1,750	2,490	2,745	3,955
Communist China										
Tanker	10	14	19	27	23	32	43	60	118	165
Dry cargo	93	130	311	437	387	542	714	1,000	1,958	2,741
Total	103	144	330	464	410	574	757	1,060	2,076	2,906

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Table 1

Estimated Growth of Sino-Soviet Bloc Fleets
Selected Years, 1950-75
(Continued)

Thousand Gross Register Tons (GRT) and Thousand Deadweight Tons (DWT)

Fleets	1950		1958		1960		1965		1975	
	GRT	DWT	GRT	DWT	GRT	DWT	GRT	DWT	GRT	DWT
USSR										
Tanker	120	150	563	841	672	1,001	1,000	1,500	1,750	2,500
Dry cargo	1,456	2,211	2,034	2,796	2,435	3,317	3,800	5,100	6,350	8,400
Total	1,576	2,361	2,597	3,637	3,107	4,318	4,800	6,600	8,100	10,900
Total Sino-Soviet Bloc										
Tanker	137	174	632	943	815	1,212	1,290	1,922	2,403	3,445
Dry cargo	1,751	2,623	2,867	3,990	3,602	4,932	6,017	8,228	10,518	14,316
Total	1,888	2,797	3,499	4,933	4,417	6,144	7,307	10,150	12,921	17,761

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Table 2

Estimated Growth of the Sino-Soviet Bloc Merchant Fleets
Compared to Estimated Growth of Total World Merchant Fleet (Active) a/
Selected Years, 1950-75

Merchant Fleet	1950	1958	1960	1965	1975
Total world (active) b/ (million deadweight tons)	87.2	138.3	145.0	170.0	230.0
Percent increase		58.6	4.8	17.2	35.3
Sino-Soviet Bloc (million deadweight tons)	2.8	4.9	6.1	10.2	17.8
Percent increase		75.0	24.5	67.2	74.5
Sino-Soviet Bloc as percent of total world (active)	3.2	3.5	4.2	6.0	7.7

a. Vessels of 1,000 gross register tons and over. As of 31 December of each year.
b. Does not include US reserve fleet.

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Table 3

Estimated Volume of Cargo Carried in Domestic a/* and International Trade
by Sino-Soviet Bloc Merchant Fleets
Selected Years, 1950-75

Million Metric Tons

	1950	1958	1960	1965	1975
Poland	2.390	3.976	5.450	10.900	15.075
Domestic	0.042	0.050	0.050	0.060	0.075
Import/export	2.073	3.361	4.400	9.200	12.500
Between foreign ports	0.275	0.565	1.000	1.640	2.500
East Germany	0	0.545	1.420	2.475	4.400
Domestic	0	0.010	0.020	0.050	0.050
Import/export	0	0.435	1.200	2.075	3.350
Between foreign ports	0	0.100	0.200	0.350	1.000
Czechoslovakia	0	0.190	0.470	0.940	1.880
Domestic	0	0	0	0	0
Import/export	0	0.150	0.420	0.840	1.680
Between foreign ports	0	0.040	0.050	0.100	0.200
Bulgaria	0.329	0.800	1.000	1.200	1.500
Domestic	0.040	0.200	0.200	0.200	0.300
Import/export	0.189	0.500	0.700	0.850	1.000
Between foreign ports	0.100	0.100	0.100	0.150	0.200

* Footnote for Table 3 follows on p.

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Table 3

Estimated Volume of Cargo Carried in Domestic a/ and International Trade
by Sino-Soviet Bloc Merchant Fleets
Selected Years, 1950-75
(Continued)

Million Metric Tons

	1950	1958	1960	1965	1975
Rumania	0.181	0.250	0.450	1.575	3.200
Domestic	0	0	0	0	0
Import/export	0.181	0.250	0.430	1.495	3.000
Between foreign ports	0	0	0.020	0.080	0.200
Hungary	0.029	0.060	0.090	0.150	0.400
Domestic	0	0	0	0	0
Import/export	0.029	0.050	0.080	0.125	0.350
Between foreign ports	0	0.010	0.010	0.025	0.050
Albania	0	0	0.090	0.190	0.375
Domestic	0	0	0	0	0
Import/export	0	0	0.090	0.190	0.375
Between foreign ports	0	0	0	0	0
Total Satellites	2.929	5.821	8.970	17.430	26.830
Domestic	0.082	0.260	0.270	0.310	0.425
Import/export	2.472	4.746	7.320	14.775	22.255
Between foreign ports	0.375	0.815	1.380	2.345	4.150

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Table 3

Estimated Volume of Cargo Carried in Domestic a/ and International Trade
by Sino-Soviet Bloc Merchant Fleets
Selected Years, 1950-75
(Continued)

Million Metric Tons

	1950	1958	1960	1965	1975
Communist China	0.697	14.600	18.600	34.100	59.600
Domestic	0.697	14.300	17.900	27.100	47.600
Import/export	0	0.300	0.700	6.500	10.500
Between foreign ports	0	0	0	0.500	1.500
USSR	33.700	71.000	80.000	121.000	200.000
Domestic	25.000	49.600	50.000	62.700	93.000
Import/export	7.100	13.900	21.000	39.300	75.000
Between foreign ports	1.600	7.500	9.000	19.000	32.000
Total Bloc	37.326	91.421	107.570	172.530	286.430
Domestic	25.779	64.160	68.170	90.110	141.025
Import/export	9.572	18.946	29.020	60.575	107.755
Between foreign ports	1.975	8.315	10.380	21.845	37.650

a. Includes intercoastal trade for the USSR.

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Table 4

Comparison of Estimated Performance of Sino-Soviet Bloc Fleets with Estimated World International Trade Moved by Sea a/ Selected Years, 1950-75

Million Metric Tons

	1950	1958	1960	1965	1975
World international seaborne trade	550	990	1,020	1,300	1,700
Bloc fleet performance					
Total cargo	37	91	108	173	286
Cargo carried in international trade b/	12	27	39	82	145
Bloc fleet performance as a percent of world seaborne international trade					
Total cargo	6.7	9.2	10.6	13.3	16.8
Cargo carried in international trade	2.2	2.7	3.8	6.3	8.5

a. Totals in this table are derived from unrounded data and may not agree with the sums of their rounded components.
b. Includes cargo carried between foreign ports.

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Table 5

Estimated Total Seaborne Foreign Trade of the Sino-Soviet Bloc a/
Selected Years, 1950-75

Million Metric Tons

Seaborne Foreign Trade	1950	1958	1960	1965	1975
European Satellites					
Poland	13.2	13.7	13.9	14.6	16.0
East Germany	3.0	5.5	6.5	9.0	14.0
Czechoslovakia	3.0	4.0	4.5	6.0	8.5
Bulgaria	0.7	1.2	1.4	2.0	3.0
Hungary	0.7	0.9	1.0	1.2	1.6
Rumania	3.0	5.0	5.4	5.0	6.0
Albania	0.2	0.7	0.8	1.1	1.7
Total	23.8	31.0	33.5	38.9	50.8
Communist China	2.7	10.7	12.7	17.6	27.5
USSR	8.8	25.0	32.8	51.4	89.0
Total Sino-Soviet Bloc	35.3	66.7	79.0	107.9	167.3
Less duplication (Intra-Bloc trade)	6.0	8.5	10.3	15.0	25.0
Grand total	29.3	58.2	68.7	92.9	142.3

a. Totals in this table are derived from unrounded data and may not agree with the sums of their rounded components.

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Table 6

Estimated Seaborne Foreign Trade of the Sino-Soviet Bloc
Carried by Domestic and Foreign Vessels a/
Selected Years, 1950-75

Million Metric Tons

Seaborne Trade Carried by Domestic and Foreign Flag Vessels	1950		1958		1960		1965		1975	
	Domestic Flag	Foreign Flag	Domestic Flag	Foreign Flag	Domestic Flag	Foreign Flag	Domestic Flag	Foreign Flag	Domestic Flag	Foreign Flag
European Satellites										
Poland	2.1	11.1	3.4	10.3	4.4	9.5	9.2	5.4	12.5	3.5
East Germany	0	3.0	0.4	5.1	1.2	5.3	2.1	6.9	3.4	10.6
Czechoslovakia	0	3.0	0.2	3.8	0.4	4.1	0.8	5.2	1.7	6.8
Bulgaria	0.2	0.5	0.5	0.7	0.7	0.7	0.8	1.2	1.0	2.0
Rumania	0.2	2.8	0.2	4.8	0.4	5.0	1.5	3.5	3.0	3.0
Hungary	0	0.7	0	0.9	0.1	0.9	0.1	1.1	0.3	1.3
Albania	0	0.2	0	0.7	0.1	0.7	0.2	0.9	0.4	1.3
Total	2.5	21.3	4.7	26.3	7.3	26.2	14.7	24.2	22.3	28.5
Communist China	0	2.7	0.3	10.4	0.7	12.0	6.5	11.1	10.5	17.0
USSR	7.1	1.7	13.9	11.1	21.0	11.8	39.3	12.1	75.0	14.0
Total Sino-Soviet Bloc	9.6	25.7	18.9	47.8	29.0	50.0	60.5	47.4	107.8	59.5
Less duplication (Intra-Bloc trade)		6.0		8.5		10.3		15.0		25.0
Grand total	9.6	19.7	18.9	39.3	29.0	39.7	60.5	32.4	107.8	34.5

a. Totals in this table are derived from unrounded data and may not agree with the sums of their rounded components.

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Figure 1

Growth of Sino-Soviet Bloc Fleets, 1950-75

(Thousand dead-weight tons)

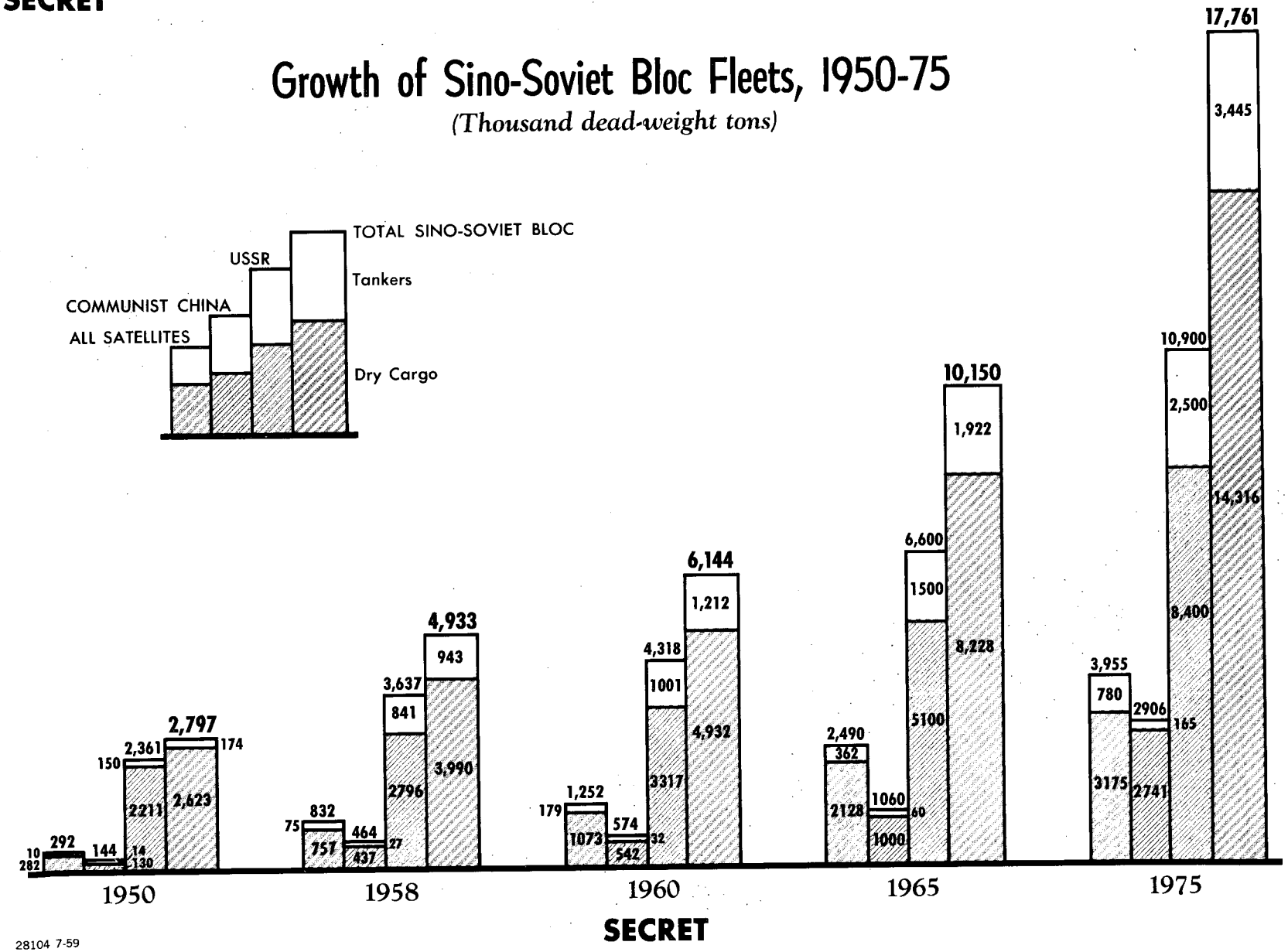

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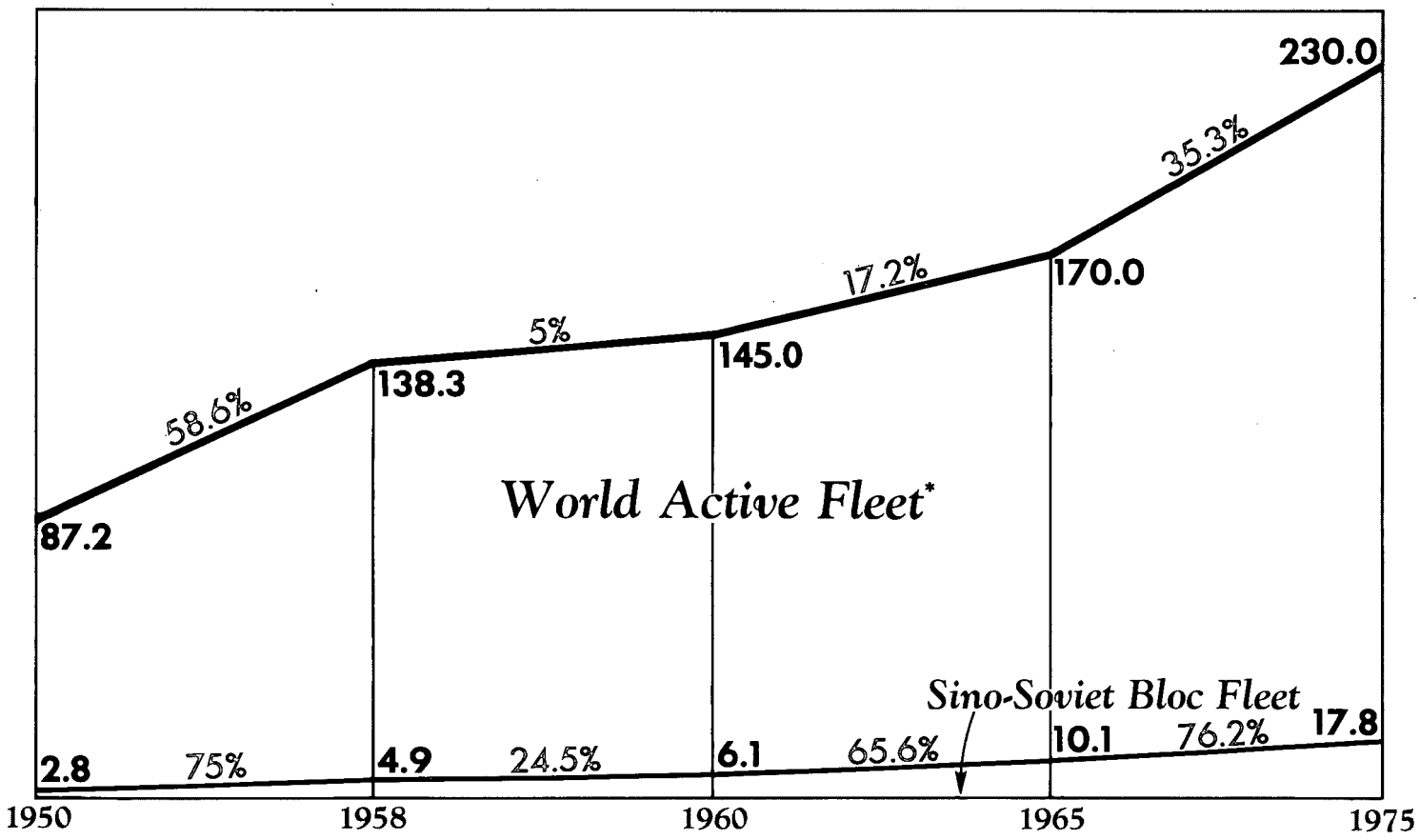
Figure 2

Growth of the Sino-Soviet Bloc Merchant Fleets Compared to World Total, 1950-75†



†*Vessels of 1,000 GRT and over. As of 31 December of each year.*

**Does not include US Reserve.*

Numbers in red show the percent increase over the previous year.

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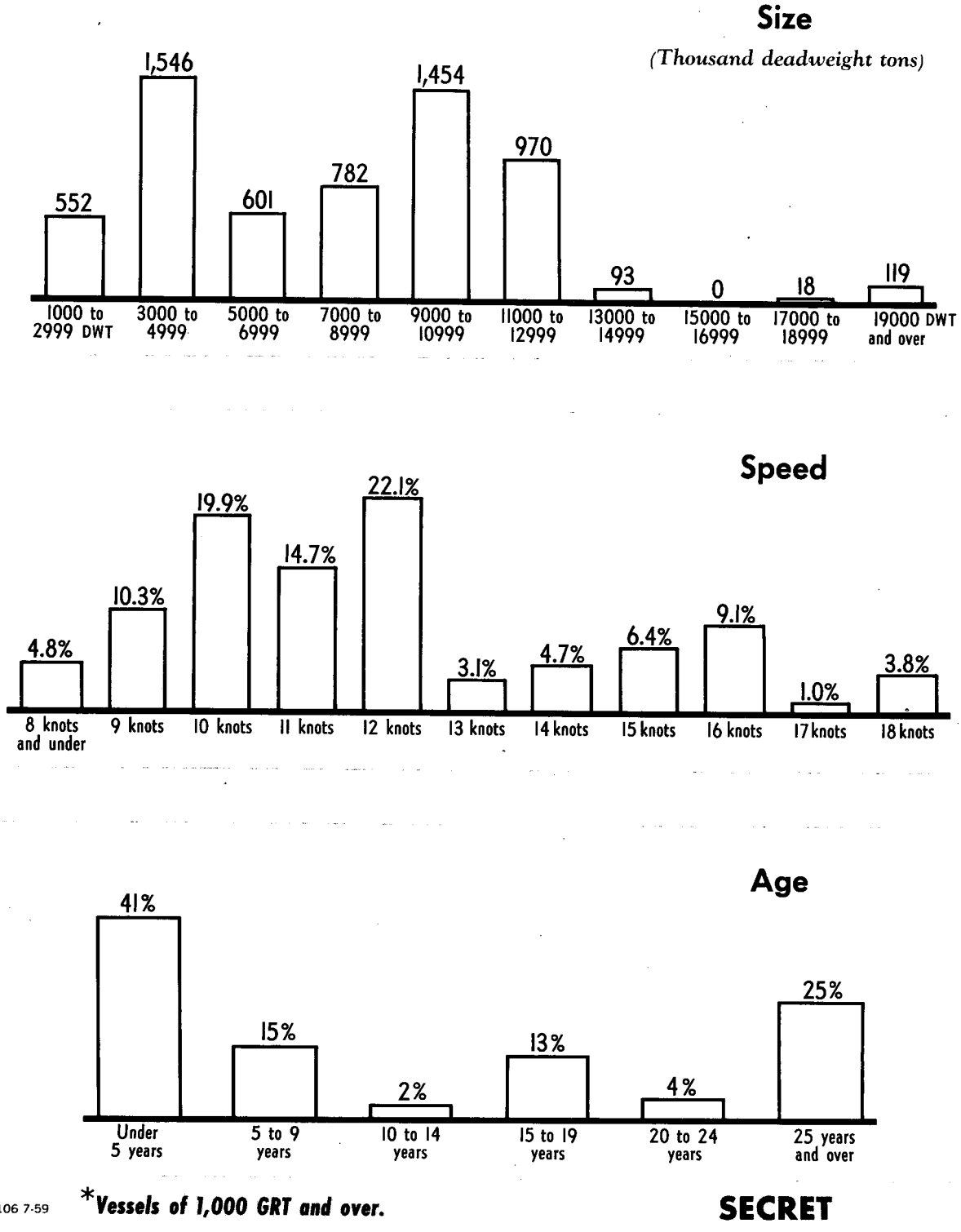
Figure 3

Size, Speed, and Age Characteristics of Sino-Soviet Bloc Fleets,* 1960



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*Vessels of 1,000 GRT and over.

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Figure 4

New Vessel Types, Sino-Soviet Bloc Fleets, 1960-75

	GROSS REGISTER TONS	DEADWEIGHT TONS	LENGTH OVER-ALL	LENGTH BETWEEN PERPENDICULARS	BEAM	DRAFT	HORSEPOWER	PROPULSION	SPEED	STATUS
U.S.S.R.										
CARGO (Leninskiy Komsomol)	12,090	14,500	548	510	71	32	13,000	Steam Turbine	18.6	Under Construction
CARGO (Superstructure Aft)	7,500	11,000	—	—	—	—	———	Diesel	17	Planned
TANKER (Pekin)	20,000	28,970	664	615	84	34	19,000	Steam Turbine	17.7	Under Construction
TANKER (Gas Turbine)	11,500	18,300	—	—	—	29	13,000	Diesel/Gas Turbine	17	Planned
POLAND										
CARGO (B-54)	7,589	10,000	505	465	64	27	8,000	Diesel	16.8	Series Construction
ORE CARRIER (B-512)	8,520	12,000 or 14,500	517	477	66	21	6,500	Diesel	14.5	Planned (1961)
TANKER (B-70)	12,600	18,000	407	368	54	21	5,000	Diesel	15	Under Construction
TANKER (B-73)	22,500	35,000	683	647	88	36	13,000 to 16,000	Diesel or Turbine	15	Planned (1961)
TANKER (Nuclear)	———	35,000	686	—	87	—	24,000	Organic Reactor	20	Planned (1970)
CHINA										
CARGO (Leap Forward)	11,100	15,700	577	512	71	31	13,000	Steam Turbine	18.5	Under Construction
TANKER (B-70)	12,600	18,000	407	368	54	21	5,000	Diesel	15	Planned (1961)
CARGO (Canton Yard)	7,900	12,000	529	480	67	28	———	———	—	Planned
EAST GERMANY										
CARGO (Frieden)	6,600	10,000	508	—	65	27	8,000	Diesel	—	Under Construction

28107 7-59

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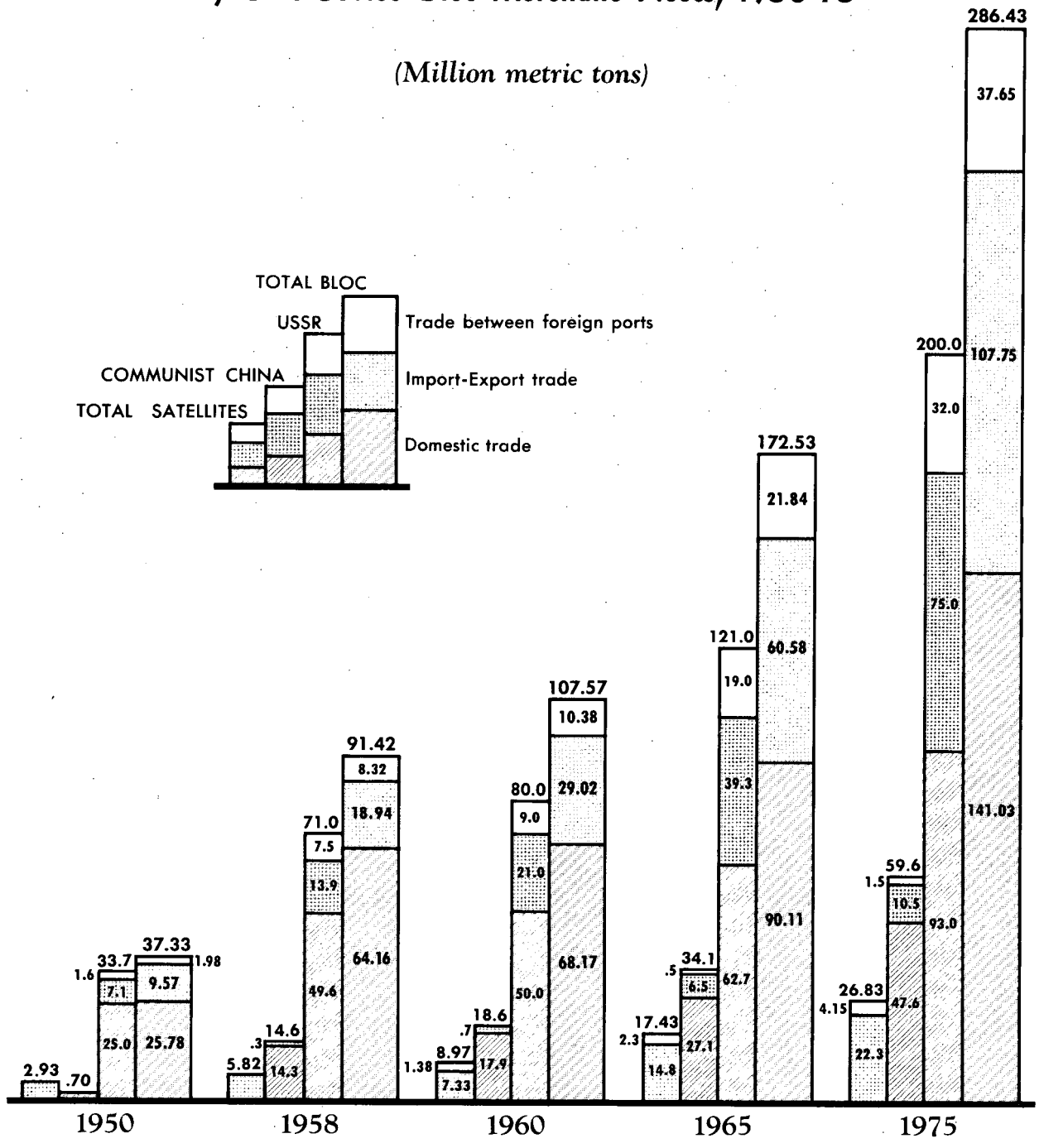
Figure 5

Estimated Cargo Carried in Domestic* and International Trade by Sino-Soviet Bloc Merchant Fleets, 1950-75

(Million metric tons)



*Includes Intercoastal Trade for the USSR.

28108 7-59

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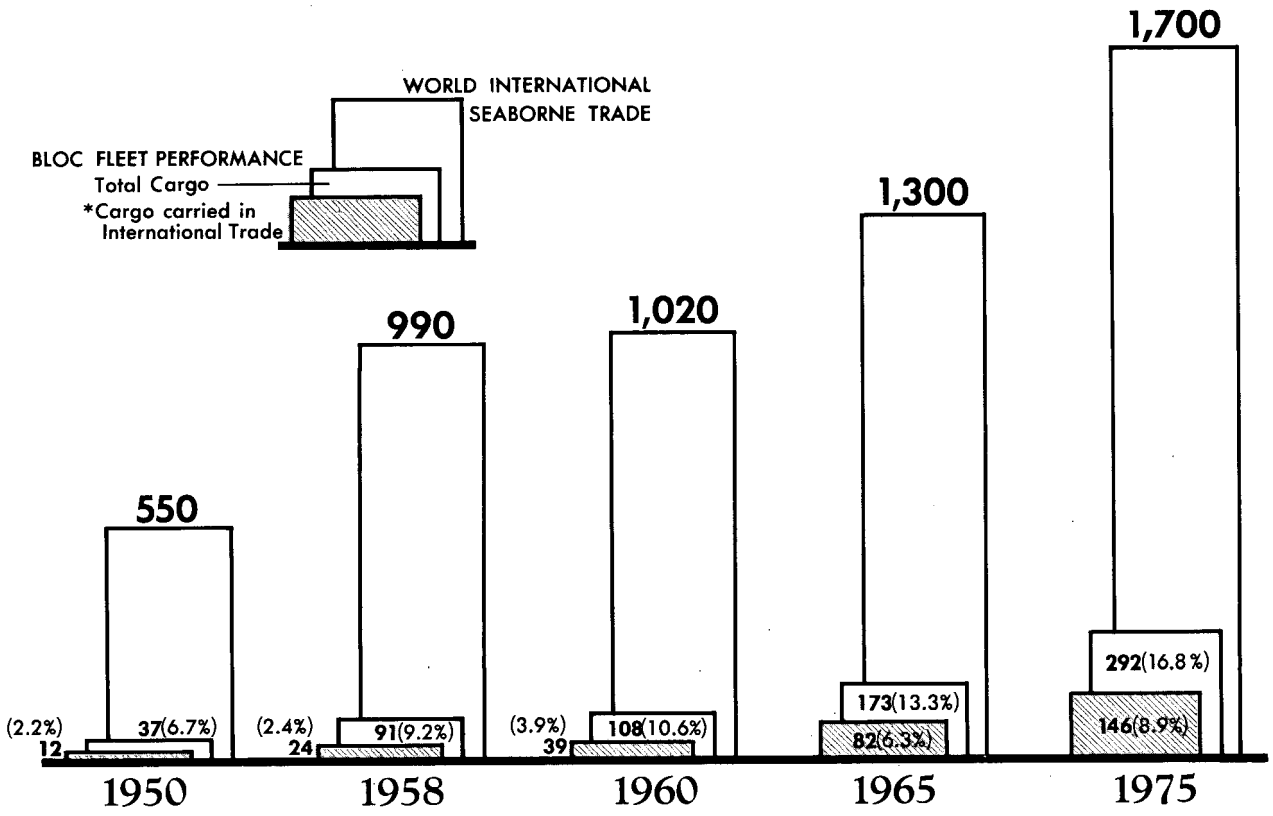
Figure 6

Comparison of Performance of Sino-Soviet Bloc Fleets with World International Trade Moved by Sea, 1950-75

(Million metric tons)



Includes cargo carried between foreign ports.

Numbers in red show Bloc performance as a percent of World International Seaborne Trade.

28109 7-59

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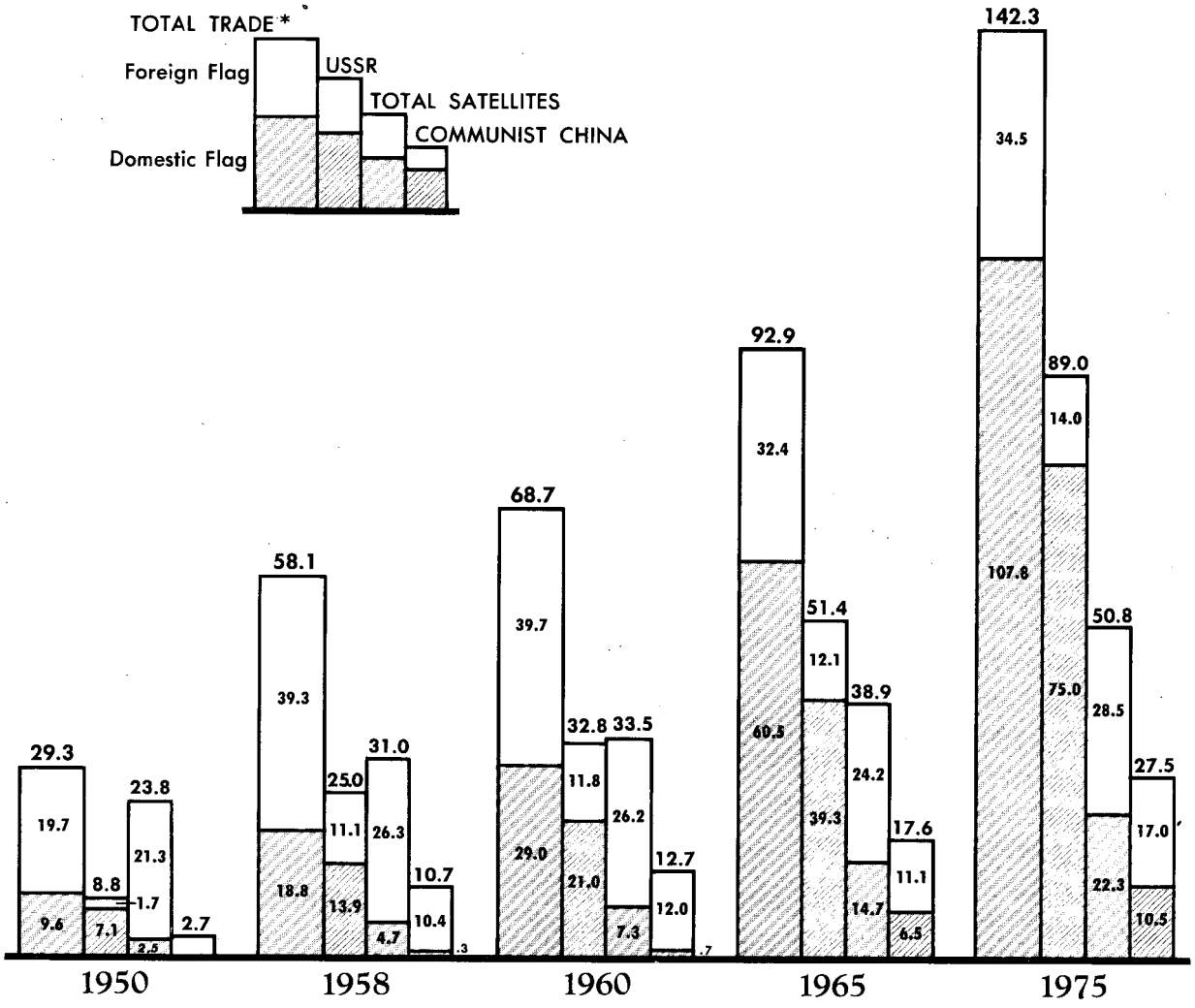
Figure 7

Seaborne Foreign Trade of Sino-Soviet Bloc Carried by Bloc Vessels and by Foreign Vessels, 1950-75

(Million metric tons)



*Minus estimated duplicate traffic (intra-Bloc)

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S-E-C-R-E-T

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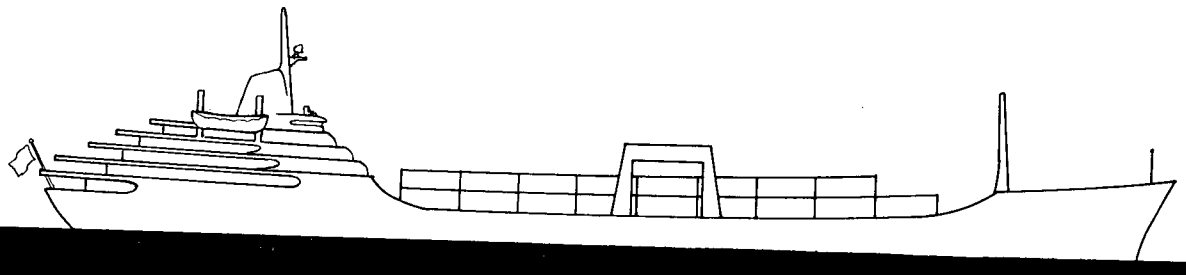
PROJECT WALRUS

The Role of the U.S. Merchant Marine in National Security



National Academy of Sciences–
National Research Council

Publication 748

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Dr. Hartley Rowe
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Park Square Building
Boston, Massachusetts

Mr. Raymond S. Stevens
President, Arthur D. Little, Inc.
30 Memorial Drive
Cambridge, Massachusetts

Project Staff

Dr. Franklin C. Brooks, Technical Director

Mr. Robert B. Keating, Executive Secretary

THE ROLE OF THE U. S. MERCHANT MARINE IN NATIONAL SECURITY

Project WALRUS Report

by the

Panel on Wartime Use of the U. S. Merchant Marine

of the

Maritime Research Advisory Committee

Division of Engineering and Industrial Research and

Division of Physical Sciences

Publication 748

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Washington, D. C.

1959

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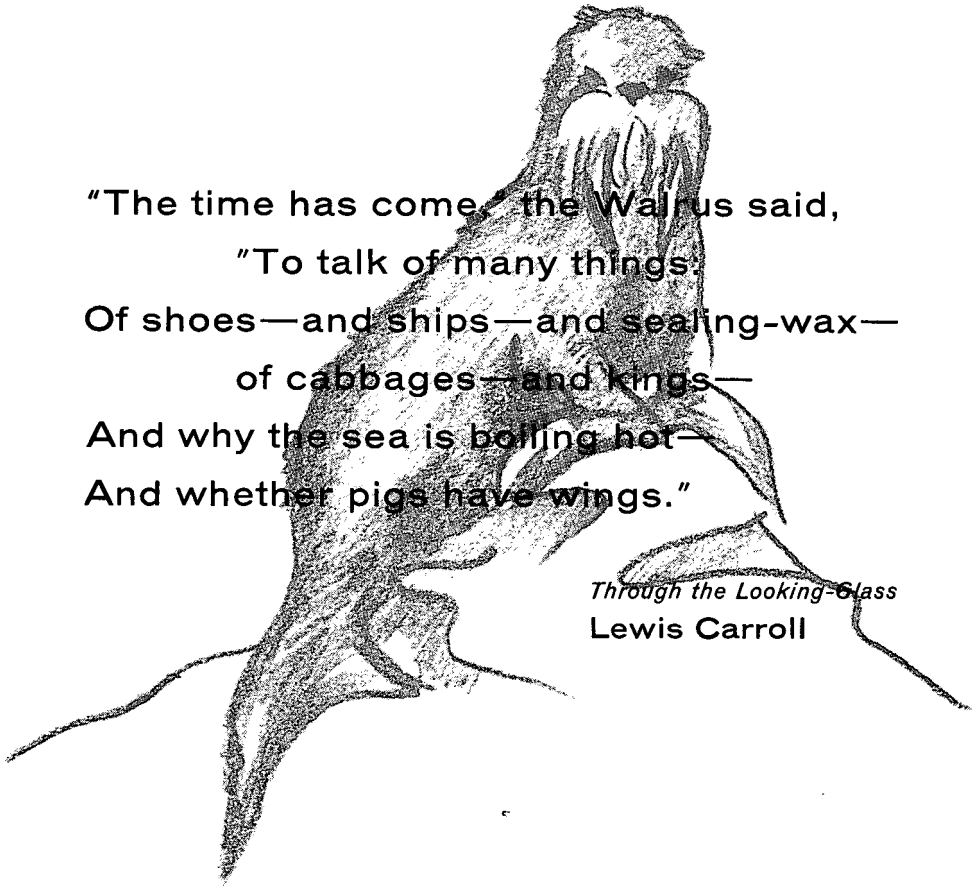

"The time has come," the Walrus said,
"To talk of many things:
Of shoes—and ships—and sealing-wax—
of cabbages—and kings—
And why the sea is boiling hot—
And whether pigs have wings."

Through the Looking-Glass
Lewis Carroll

NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL

MARITIME RESEARCH ADVISORY COMMITTEE
OF THE
DIVISION OF ENGINEERING AND INDUSTRIAL RESEARCH
AND THE
DIVISION OF PHYSICAL SCIENCES
2101 CONSTITUTION AVENUE, WASHINGTON 25, D. C.

November 6, 1959

Mr. Louis H. Roddis, Jr.
Chairman
Maritime Research Advisory Committee
National Academy of Sciences
National Research Council
2101 Constitution Avenue, N. W.
Washington 25, D. C.

Subject: Report of the Maritime Research Advisory Committee's Panel on Wartime Use of the U. S. Merchant Marine

Dear Mr. Roddis:

Enclosed is a report entitled "The Role of the U. S. Merchant Marine in National Security". This report stems from Project WALRUS, the 1959 summer study session at Woods Hole, Massachusetts. This study was sponsored by the Maritime Research Advisory Committee's Panel on Wartime Use of the U. S. Merchant Marine and this publication comprises the final report to the Committee.

This work was carried out as part of Contract MA-1767 with the Maritime Administration.

Very truly yours,

Arthur W. Radford

Arthur W. Radford, Adm., USN (Ret.)
Chairman
Panel on Wartime Use
of the U. S. Merchant Marine
of the Maritime Research
Advisory Committee

FOREWORD

Project WALRUS, a summer study, was a principal function of the Maritime Research Advisory Committee of the National Academy of Sciences--National Research Council. This Committee, operating under a contract between the National Academy of Sciences and the Maritime Administration, has the task of advising the Maritime Administration on the "nature, organization and prosecution of a scientific research and development program" appropriate to the Maritime Administration's objectives and responsibilities.

This parent committee has established a variety of panels covering many aspects of the maritime problem. The Panel on Wartime Use of the U. S. Merchant Marine, under the chairmanship of Admiral Arthur W. Radford, USN (Ret.), was directly responsible for Project WALRUS. For the purposes of the summer study this nine-man panel was augmented by representatives of government agencies, the military services, and university and industrial research organizations.

Project WALRUS was conducted during the period August 10 to 28, 1959 at the Whitney Estate, Woods Hole, Massachusetts. The average number of participants over the period was about 35. Dr. Franklin C. Brooks was the Technical Director of the Project. Mr. Robert B. Keating, Executive Secretary, played a major role in assembling the group of participants and in preliminary formulation of the problem.

The initially stated objective of Project WALRUS was: "To examine present and future military demands on the U. S. merchant marine in order that technical requirements can be derived for maritime research and development planning. "

During the first week the Project participants were briefed by selected government and military agencies and university and industrial groups concerned with the merchant marine.

As the deliberations of the participants began, it quickly became apparent that the scope of the Project should be broadened to encompass the national security role of the U. S. merchant marine; and that a major demand was placed on the merchant marine by the currently intensifying political-economic conflict, the cold war into which the United States has been inescapably drawn. This enlargement of scope led directly to the title of this report, "The Role of the U. S. Merchant Marine in National Security".

Applicable classified information was made available to the WALRUS participants. However, because the main content of the deliberations did not involve security information, this report has been unclassified. It is believed that the resulting gain in breadth of distribution and availability will more than compensate for the omission of a small number of classified details.

In a study of the short duration and high intensity of Project WALRUS, little new research can be done. The results presented here are primarily a new synthesis of known facts accomplished by a qualified group with diverse backgrounds and wide experience. There was a close approach to unanimity in the group on the major policy recommendations.

The results of the study, embodied in this report, are extremely gratifying to the Maritime Research Advisory Committee. The WALRUS participants have shown the favorable results that can come from a high level of cooperative effort put forth in a well organized study session isolated from the usual pressures of everyday life. The Maritime Research Advisory Committee considers this report to be a most important contribution to its work. The Committee sincerely appreciates the dedicated effort of all those who had a hand in the study and would like to encourage wide dissemination of the report because of its genuine importance at this critical time in United States maritime affairs.

Louis H. Roddis, Jr.
Chairman
Maritime Research
Advisory Committee
National Academy of Sciences
National Research Council

CONTENTS

ABSTRACT

The U. S. merchant marine is deteriorating. Most of its ships are nearly overage and long outmoded from the standpoint of modern design. U. S. flag shipping is carrying a steadily decreasing portion (12 percent in 1958) of U. S. foreign trade. Concurrently, the United States is in danger of losing its "flag of convenience" fleet which carries about a third of its foreign trade and over which the Government now has effective control. The current rate of subsidy funding shows small promise of assuring timely replacement of the subsidized segment of the U. S. flag fleet. Most owners of nonsubsidized U. S. flag ships have little incentive for even starting a replacement program. This decline is of serious concern to the Government, to industry, and very particularly to the military services. Energetic leadership is required to correct this trend.

The U. S. merchant marine should be prepared to play a significant national security role in three types of conflict: (a) the intensifying political-economic conflict (cold war) that is with us now; (b) the spectrum of limited wars which we may face at any time at the option of the enemy; and (c) the more remote possibility of general nuclear war.

In their political-economic offensive, our opponents have avowed their intention to "bury" us in the field of international trade. They are expanding their merchant fleets to carry this trade. The United States must use its merchant marine defensively to counter economic thrusts--it must also use it positively as a weapon in the cold war arsenal. However, the U. S. flag fleet is in danger of becoming unable to meet the challenge and the continued ability of the "flag of convenience" fleet to serve as an instrument of national policy is threatened.

U. S. flag shipping, augmented by "flag of convenience" shipping, is adequate in quantity to meet reasonable expectations of limited war needs, at least through 1965. The fleet in general, however, is qualitatively deficient for limited war purposes because of inadequate speed, relatively low cargo-handling rates, and lack of "over the beach" capability--coupled with obsolescence.

In the event of general nuclear war, the merchant marine could play a vital role in rescue, rehabilitation, and restoration. It is likely to be the least damaged transportation resource. The panel believes, however, that this role should not dominate maritime planning. A foresighted, positive program designed to meet cold and limited war needs will go a long way toward producing an effective fleet for general war tasks.

National security maritime needs will be largely met by the construction of a fleet which can be commercially competitive with minimum subsidy. Both commercial and military interests can effectively use balanced speed in cargo handling and ocean transit, unitization of cargoes, and automation of ship operations to attain their goals. Such features entail capital intensification in order to reduce the number of man-days required to load, sail, and discharge a merchant ship.

Additionally, the military services require a number of special ships having "over the beach" cargo-handling capability. These ships may even prove effective in specialized commercial operations, such as in meeting Communist competition in underdeveloped countries that have limited port facilities. Their utility as an instrument of national economic policy should be thoroughly explored.

Three main steps should be taken now to assure a strong merchant marine in support of national security needs.

Immediate action by the Government is required to avoid the flight of "flag of convenience" shipping from effective U. S. control to uncontrolled registries under European flags. Some degree of exodus has already started.

The Government should be prepared to take the lead in enlisting the co-operation of maritime labor and management to produce a technologically feasible fleet which will be commercially competitive with minimum subsidy. Without significant improvement in the attitudes of both labor and management towards technological advances, we can achieve no sound basis for competitive objectives.

The goal of the Maritime Administration's Research and Development Program should be established as the creation of a U. S. merchant fleet which can be self-supporting without subsidy; and the Program should be so conducted as to lead rapidly to ships in being which demonstrate this possibility.

I. INTRODUCTION

A. HISTORICAL BACKGROUND

Despite a tradition of competence, the U. S. merchant marine has been subject historically to a series of peaks and valleys.

During the fifty-year period following the establishment of the United States as an independent nation, the U. S. merchant marine thrived with little or no Government aid. The best wooden ships in the world were available from domestic shipbuilders at lower prices than foreign shipbuilders could meet.

With the advent of the metal ship, shortly before the Civil War, the U. S. owner lost this construction cost advantage. The New England shipbuilding industry was inadequate to meet this new technological advance without Government aid. For the next century this aid took the primary form of ocean-mail contracts. The program was administered in a sporadic fashion which made ship operation an insecure investment, and at times the U. S. flag ship almost disappeared from the seas. During World War I, the Government, faced with a serious shipping shortage, undertook a huge building program. Only a few ships were delivered, however, before the signing of the Armistice in 1918. As the building contracts did not include a cancellation clause, ships continued to be built through 1921.

Following World War I, the Government was slow to dispose of the war-built fleet because of a reluctance to sell these ships at less than cost. The opportunity to compensate U. S. shippers for construction cost differentials, through a program of selling them ships at prices they could afford, was present at that time but not effectively utilized.

In 1935, with the war-built fleet in a condition of obsolescence, the President proposed legislation designed to discard the obsolete mail contract program and to establish a forthright program of construction-differential and operating-differential subsidies. This program was embodied in the Merchant Marine Act of 1936 and is the basic policy under which the nation is operating today. Subsidies are paid for the construction and operation of vessels built in the United States and operated under the U. S. flag on essential foreign trade routes. These subsidies are designed to compensate the operators for the higher U. S. building and operating costs.

U. S. entry into World War II interrupted the operation of the 1936 Act and occasioned the mass production of some 5500 U. S. merchant ships. Many of their design features were matters of expediency rather than choice and substitute materials were used perforce in numerous cases.

Now, in 1959, we again face the problem of replacing a war-built fleet that is long outmoded from the standpoint of modern design.

B. PRESENT SITUATION

The present decline of the U. S. merchant marine is a matter of vital concern to the Government, to industry, and very particularly to the military services. Foreign shipping policies and the number of relatively new foreign flag ships are causing increasing difficulty in meeting foreign flag competition, even for the subsidized portion of the U. S. flag merchant fleet.

Reasons for the decline are many. In the unsubsidized portion of the U. S. fleet, operating costs are almost prohibitive. In both subsidized and unsubsidized segments, construction costs are high. There is a general lack of incentive to take advantage of technological advances to offset these costs.

The withering of the merchant marine is of especial concern at this time. The nation is presently engaged in a political-economic struggle--which Soviet leadership, at least, regards as a struggle for survival. It is further confronted with secondary threats involving a range of limited war situations. It must also face the possibility of general war, i. e., a nuclear exchange on the homelands. The limited and general war situations most deeply concern the military services, for they depend on a vital shipping industry for direct support. Even more disturbing, however, is the merchant marine's threatened inability to cope with the requirements of the current war, a political-economic war, which is certainly the most immediate and may well prove to be the most crucial struggle.

The problems involved are very complex, the solutions no less so. The decline of the total maritime industry is one which has wide implications. Government, private industry, and the military services are all affected in various ways. The attitudes of management and labor, the numbers and abilities of technicians, the degree of guaranteed government support, all affect the future of the U. S. merchant marine--and more basically, whether indeed there will be one.

Basic national policy regarding the merchant marine was last expressed 23 years ago in the Merchant Marine Act of 1936 at a time when the United States was essentially a self-sufficient nation. Today, in direct contrast to the situation in 1936, the U. S. is a raw-material importing country, dependent as never before on overseas transportation for importing raw materials and exporting manufactured goods.

Since 1936, and particularly since 1945, shifts in power alliances, developments of complex weapon systems, the development of what appears to be a long period of cold war, technical possibilities in transport systems, and the pressing need to replace an obsolescent fleet have led to the now urgent need for a reappraisal of the whole merchant marine area.

It was for this purpose that the Maritime Research Advisory Committee's Advisory Panel on Wartime Use of the U. S. Merchant Marine was created. The Panel, with other participants, now presents a general appraisal of the current situation, an assessment of the merchant marine mission, a survey of technological possibilities, and its best conclusions and most considered recommendations as to steps that should be taken to improve the capability of the merchant marine to meet future contingencies. These guidelines are suggested in the conviction that the U. S. maritime industry will not long survive unless it can be given a common national orientation leading to an orderly, progressive, and purposeful development and employment.

The Panel has found important areas of common agreement among its members, who represent many diverse interests and disciplines. The Panel hopes and believes that its recommendations will prove of value to the Maritime Administration in orienting its research and development program, for the generation of such guidance was the precise purpose for creating the Maritime Research Advisory Committee.

II. THE RANGE OF THE THREATS

A. SURVEY OF THREATS

If the threat of a general war, i. e., a nuclear war against the homelands, is successfully averted by a deterrent combination of land and sea-based missiles and bombers, then the threat of other types of warfare may be expected to increase.

The most serious threat during the next fifteen years is expected to be political-economic (cold) war in which the military services are not directly involved. This judgment is based on intelligence estimates to the effect first, that it is already in progress; second, that it has been announced by the Soviets as their preferred road to "victory" over the non-Communist powers; and third, that its prosecution lies well within their capabilities over the allotted time span. In short, action, announced intention, and capability complement one another. The threat and its dimensions as they affect the merchant marine are detailed below.

As the cold war is intensified, the likelihood of limited war situations can be expected to increase rather than to decrease. The wide range of conflicts in which the military services might have to play a part in the next decade and a half may be gauged from the experience of the immediate past. Situations of the magnitude of the Korean War and the crisis in Lebanon bound the extremities of the situations with which the military and its merchant marine auxiliary could be expected to have to cope.

Finally, there is also the outside possibility that, perhaps accidentally, perhaps by some serious human miscalculation, perhaps by irrational design, the general war may become a reality.

These three situations--political-economic war, limited military action, and general war--are considered; war fought with the same type weapons and methods of World War II is not. The reason given, and there was general acceptance of this argument by the conferees, is that such a war is, and would be, outside the realm of practical possibility.

B. THE SOVIET MERCHANT MARINE AND THE THREAT ON THE ECONOMIC FRONT

> "We declare war upon you -- excuse me for using such an expression -- in the peaceful field of trade..... We are relentless in this, and it will prove the superiority of our system."
>
> Nikita Khrushchev, 1957

Since the death of Stalin, the political élite in the Soviet Union has made it abundantly clear that it is on the economic front that the Communists expect to "bury" the capitalist nations, as Premier Khrushchev has put it. This threat has been repeated to U. S. visitors to the Soviet Union time and time again. Furthermore, given the evident pride of the Soviets in the growth of their economy together with the prestige which recognition in science has brought them, there is every reason to deduce that

such a struggle might very well have a peculiar fascination for the Soviets. Allen Dulles, the Director of the Central Intelligence Agency, summed up the threat in these words, "..... they [the Soviets] will buy anything, trade anything, and dump anything if it advances Communism and helps destroy the influences of the West."

Furthermore, despite the smallness of the Soviet effort in terms of relative expenditure, and despite occasional setbacks, the U. S. S. R. has reason to be content with the results of its economic aid program. This, in turn, means that it must be satisfied with the methods which it has been using to accomplish these ends. From the Soviet point of view there is, moreover, every reason why it should plan to continue to exploit its present approach, so well does it seem to be adapted to its own meager consumer economy. This is particularly true since dictatorship can do more with less because it can channel any given segment of its economic strength to achieve a political gain at any given moment.

Finally, the U. S. S. R.'s new shipbuilding programs make it self-evident that it understands the gains which might be derived from the possession of a new and proud merchant marine, one which would be a visual tribute to Soviet manufacture in any world port. What the Sino-Soviet Bloc has done, is doing, and plans to do to modernize its merchant marine is indicated in brief below:

1. The Sino-Soviet Bloc Fleet: Size and Characteristics. The combined Sino-Soviet Bloc fleets in 1960 will probably total over six million deadweight tons, of which over four million tons will be under the Soviet flag; over one million tons; under satellite flags, mostly Polish; and approximately 530,000 tons under Communist China's flag. Available plans indicate that the Bloc fleet will more than double in capacity by 1965 compared with 1958, and the fleet capacity in 1975 may be three and one-half times that of 1958.

These sizable increases may result in the Bloc proportion of the world fleet increasing from over three percent in 1958 to about eight percent in 1975.

Soviet vessels engaged in foreign trade are turning up on almost all major world trade routes except Oceania, South and East Africa, the West Coast of South America, and the United States.

2. Vessel Acquisitions. The years 1958 and 1959 mark a turning point in the character of Soviet fleet acquisitions. Newly acquired ships have such up-to-date features as mechanical hatch covers and unstayed bipod masts. Both tankers and dry cargo ships have air conditioned one- and two-man rooms for the crews. These same features appear in many of the smaller types of ships which the U. S. S. R. is currently planning to add to its fleet. Other modern features contemplated for some of these smaller types are shipboard cranes and adjustable-pitch propellers.

3. Adequacy of the Sino-Soviet Bloc Merchant Marine. In 1975 the share of the total foreign trade of the Bloc carried in its own vessels will probable be from three-fourths to nine-tenths, indicating virtual independence of Western maritime services. The trend since 1950 has been for greater self-sufficiency and less dependence on foreign (particularly non-Bloc) vessels. Considerable progress has been made toward achieving this objective, and by 1975 the goal should virtually be realized.

4. Potential of the Bloc Maritime Fleet. After World War II, the shipbuilding industry in the U. S. S. R. and its satellites underwent extensive expansion and modernization. During the immediate postwar period, the U. S. S. R. initiated a rapid

build up of its naval and merchant fleets. Upon the completion of the major part of the naval vessel construction program in about 1955-56, the shipyards of the U. S. S. R. turned to producing merchant tonnage.

The shipyards in the U. S. S. R. range in technical development from very advanced to most primitive. The larger yards, such as the Baltic and Admiralty shipyards in Leningrad and the Nosenko yard in Nikolayev, are in some respects more advanced than those in Western Europe and the U. S. In welding techniques and weld-testing equipment, the shipbuilding industry of the U. S. S. R. is equal to that of the combined Western powers.

5. Means of Bloc Competition with Free World Maritime Fleets. There is always the possibility that the Sino-Soviet Bloc could or would use its fleets as instruments of economic warfare rather than primarily as national services. If such a policy were carried to the extreme, it is conceivable that the Bloc would engage foreign ships to carry its own import-export trade and would use its present foreign trade fleet of approximately three million deadweight tons* and its estimated 1975 foreign trade fleet of about 13 million tons* to compete against free world vessels for free world cargoes. The piecemeal disruptive effects could be rather severe, not only by 1975 but at present.

The use of rate undercutting could overcome any characteristics of Soviet vessels which are inferior to those of the modern segments of the world fleet. The tactics could be to select a certain trade route or routes and to place enough appropriate shipping into the run to blanket sailings of scheduled lines, and to offer inducement rates.

Already some of the considerable fleet of Western ships (about one million tons) under charter to Communist China have been released from Chinese coastal operations and are being used as a rate-cutting instrument in Chinese foreign trade. Many Western conference lines are already finding no Chinese cargo available.

The Bloc fleets can be used to service the underdeveloped nations as a form of economic penetration. This in fact is already being done. Scheduled lines are expanding to make regular calls at Near East and Southeast Asian ports as well as South American ports.

Technical assistance is also being offered by the Bloc maritime industries to underdeveloped nations which are attempting to build their own fleets. The first large-scale example is Soviet and Polish activities in Indonesia.

A joint maritime organization is reportedly being planned under the auspices of the Committee on Transportation of a Council for Mutual Economic Assistance (CEMA). Such a central control of Bloc fleets could present a very effective competitive front. Moreover, we may expect that it will be used effectively in close support of Communist international political and economic objectives.

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* Tonnage employed in coastal trade deducted from totals.

C. TOWARDS A DEFINITION OF THE LIMITED WAR

The threat of future limited wars is a very serious one. Exactly where, how, or when they will break out is beyond the capability of man to predict. Perhaps low-yield atomic weapons will be used. Perhaps limited wars will be fought with rifles, artillery, and light bombers. These eventualities no one can delineate with any certainty. Yet there are certain peripheries to a definition of limited war which can be used for planning purposes. These are imposed by limitations on the ability of the United States to respond with like force to a number of military exigencies.

For example, for the purposes of this study, military actions larger than the Korean War were deemed impractical to consider. It was felt that the character of the war at a level of expenditure of men and materiel above that of the Korean War would so change the conflict that general war could be anticipated.

For all practical intents and purposes the character of the war would also change if the lines of sea communication were violated by mass attack--whether by submarine, mine, missile, or bomber. It is assumed that the Soviets both know and understand that the indispensable condition of limited war is an inviolate base structure plus inviolate lines of communication. Hence, in this study, attrition rates were not emphasized in the evaluation of our transport capability to meet situations of limited war, an omission of little importance in this study.

Since limited war is possible at many places around the periphery of the Sino-Soviet Bloc, particularly in the Near East and Far East, one of the very serious shortages in future operations may very well be port facilities of any but the crudest types.

D. GENERAL WAR

Damage estimates for general war situations are extremely difficult to gauge. Probable target systems, the over-kill planned by the Soviet military staffs, the circumstances of the first strike are all subject to wide ranges of differing opinion. Hence, deriving any hard figures of merchant marine survival in such a situation, except in order of magnitude, verges on the impossible. This threat, therefore, while the least likely, is certainly the most difficult to deal with in any completely rational sense. The role of the merchant marine in such a conflict is simply based on the best estimates, gathered from the various studies on the subject, of the probable outcome of a nuclear exchange.

In this connection, the destruction of dock facilities is of particular importance. During the period when a merchant marine might be most useful in rehabilitation and survival work, port facilities might be in most unsatisfactory condition, and "over the beach" transportation facilities would have to be used.

E. SUMMARY

If the least likely threat is estimated to be that of a nuclear strike on the continental United States, then the most obvious threats are ones which have to be met either on or over the high seas. During the span of the next fifteen years, the great threat will be to the ships and goods which may be moved over the seas. The lesser threat will lie in the ability of the enemy, operating from interior lines of communication, to threaten lesser developed nations with military invasion. Here, too, the response has to be considered in terms of the U. S. ability to move troops rapidly overseas to meet the military exigencies of the situation.

III. THE ABILITY OF THE U. S. MERCHANT MARINE TO RESPOND TO THE DEMANDS OF WAR

A. RESPONSE IN LIMITED WAR AND GENERAL WAR

In responding to limited war situations, including potential limited wars such as the recent crisis in Lebanon, speed is essential. Initial movement by air will be advisable at times to achieve rapid reaction, but, except for very minor operations, shipping is essential for major weapons, equipment, and bulk of troops. Quantitatively, the United States has today in its active and reserve fleets enough shipping to meet the requirements of any limited war which can be foreseen. Qualitatively, however, the characteristics of these ships are far from ideal in speed and in cargo-loading and discharge capability under the range of conditions which must be anticipated.

For example, consideration of the use of a specific number of conventional cargo ships in a hypothetical movement problem shows that 45 days would be required to accomplish deployment of the military cargo of a typical task force from the United States to a selected foreign port. By using the same number of technologically superior ships, specifically designed for such purpose, and operating them at comparable speed, the same deployment could be accomplished in 33 days. (Only one such ship of the latter type has been built and is in service--the roll-on, roll-off ship COMET. This particular vessel is apparently not yet commercially feasible and is operated in the military service only.) In the example examined, the difference in time required to effect deployment is almost entirely attributable to improvement in the loading and discharge operations. With the specialized ship type, there is the added advantage of reducing port longshore personnel by about 60 percent.

It is noteworthy that the employment of a sizable portion of the airlift of the Military Air Transport Service achieves a much faster initial reaction time, but there is no appreciable effect on the total tonnage to be surface-lifted or on the total time to complete deployment.

Under conditions in which port facilities are not available either because of enemy action or because of the primitive nature of the objective area, special ships and/or cargo unloading systems will be required. Until their commercial feasibility can be demonstrated, the development of such ships is clearly the responsibility of the military departments.

Because a general war will involve a massive exchange of nuclear weapons, and any later military effort will follow a period of regrouping and rehabilitation, the requirements for ocean shipping cannot be accurately forecast. However, merchant shipping is very likely to be the least damaged physical resource and will not be the critically short item in the post-attack period.

B. RESPONSE IN POLITICAL-ECONOMIC WAR

The response of the United States in the current political-economic conflict must entail positive, as well as preventive, actions.

U. S. flag ships must be available to deliver substantial portions of U. S. economic and military aid to bolster those nations whose support and friendship the United States wishes to maintain. Blue-ribbon examples of U. S. marine technology, such as the nuclear ship SAVANNAH and the high-speed mechanized cargo ships recommended in this study, should be displayed around the world to demonstrate U. S. technological progress and its corresponding ability to respond promptly and effectively in limited war emergencies. The United States should be prepared to undertake, in special cases, pre-emptive buying of the excess produce of countries whose commercial and military allegiance is desired, and to carry away the cargoes in U. S. flag bottoms.

Defensively, U. S. flag shipping must be available to counter rate-cutting actions and attempts to capture the free world trade by the Sino-Soviet Bloc. The expanding industrial economy of the United States has grown increasingly dependent on foreign sources of raw materials--and on foreign markets for its products. Adequate modern shipping under U. S. control is required to ensure the timely and steady flow of import and export materials. Without U. S. -controlled merchant fleets this country could be denied shipping when most needed. The United States could also be denied influence on shipping rates. In examining the ability of the United States to meet the challenge of political-economic war in which it is now engaged, analysis of an inventory of U. S. flag and "flag of convenience" shipping in commercial service yields somber data. From Table I, it will be seen that as of July 1, 1959, the privately-owned U. S. flag merchant fleet consisted of 1013 ships, of which only 206 were of post World War II construction. Projected construction plans show negligible promise of offsetting the rapidly approaching obsolescence of the vast majority of these 1013 ships. The same is true of Government-owned shipping.

Table I also reveals that a significant part of the U. S. owned tanker and dry bulk fleets are now operated under the flags of Panama, Liberia, and Honduras (PANLIBHON)--the so-called "flags of convenience". U. S. -owned fleets operated under "flags of convenience" are, for the purposes of this study, considered to be under effective U. S. control. Increased pressures, both domestic and foreign, threaten to make it economically impracticable for U. S. shipowners to continue operations under PANLIBHON flags. If the ability to operate under such "flag of convenience" registries were to be denied to our shipowners, the vessels might well turn to other, non-U. S. controlled foreign registries, with a consequent disastrous loss to U. S. controlled shipping capability.

"Flag of convenience" ships account for 70 percent of U. S. total tonnage in dry bulk cargo carriers and about one-half of U. S. total tonnage in tankers. Many of these ships are new, fast, and most modern in design. They operate competitively and without subsidy primarily because the shipowners are not required to pay U. S. wage scales when operating under foreign flags. In addition, some of these ships enjoy the advantage of lower amortization costs because of construction in foreign yards.

C. CORRECTIVE ACTION

It is sometimes suggested that the United States turn to foreign construction for its future ship procurement, instead of building its vessels in U. S. yards. The economic wisdom of continuing our present operating subsidy program and other governmental protective policies has also been challenged. If this advice were to be followed precipitously, it would unquestionably erode our shipbuilding capabilities and force American berth line operators off the seas.

TABLE I

MERCHANT SHIPPING UNDER U. S. CONTROL

	Current Inventories (MSTS* Records - July 1, 1959)			New Construction	
	Active	Inactive	Total	Delivered[1] Since Dec. 31, 1945	Projected[2] Through June 30, 1963
U. S. Flag-Government Owned					
Passenger/Transport	23	92	115	3	1
General Cargo[3]	71	1,543	1,614	5	0
Tanker	29	76	105	4	1
Sub-Total	123	1,711	1,834	12	2
U. S. Flag-Privately Owned					
Passenger and Combination[4]	41	0	41	27 (17)	2
General Cargo[3]	577	16	593	77 (48)	143
Bulk Cargo	39	4	43	9 (9)	2
Tanker	275	61	336	93 (6)	22
Sub-Total	932	81	1,013	206	169
"Flag of Convenience"					
Passenger and Combination[4]	7	0	7	0	0
General Cargo[3]	77	58	135	6 (1)	6
Bulk Cargo	71	10	81	44 (2)	9
Tanker	223	72	295	156 (9)	50
Sub-Total	378	140	518	206	65
Total	1,433	1,932	3,365	424	236

* Military Sea Transportation Service

1. Figures in parentheses indicate numbers of ships delivered during period 1946 to 1948 which are basically World War II types.

2. Based on planning information available to Maritime Administration as of July 1, 1959.

3. General cargo category includes reefer and miscellaneous types.

4. Includes only ships with capacity for 50 or more passengers.

If the United States should decide to abandon Government policies that are designed to foster the maintenance of a modern and adequate merchant marine, then its commercial and military lifelines could only be maintained by a combination of:

1. The U. S.-owned "flag of convenience" fleet--as long as it is available--for a significant portion of imports of oils, ores and other strategic raw materials.

2. The U. S. flag coastwise shipping fleet (relatively small)--for carrying our domestic trade.

3. Chartered foreign-owned foreign-flag vessels when these are available--and at the rates they choose to charge-- for the greatest share of U. S. general cargo imports and exports in foreign trade.

4. Expansion of the active Government-owned merchant-type fleet--entirely at Government expense--to ensure that minimum military needs will be met in the event of an emergency.

If the United States intends to preclude complete dependence on foreign controlled shipping for the maintenance of its military and commercial lifelines, the only realistic solution lies in a drastic improvement in cargo-handling and ship operating efficiency, together with significant advances in future ship design and construction. The Maritime Administration's continuing objective should be the development of a commercially competitive U. S. merchant marine requiring a minimum of subsidy. The Panel agrees that these advances are technologically feasible and can be commercially successful with minimum subsidy. To attain them it is imperative that management and labor be brought together in a common acceptance of the value to the whole industry of mechanization and automation both on the ships and in the ocean terminals.

Pending these developments the subsidy program must be maintained at least at its present level. Also, immediate Government action is required to avoid the impending flight of "flag of convenience" shipping from effective U. S. control to uncontrolled registries under European flags.

It might be argued that any competitive advantage which the United States can obtain through technological advance would be only transient--that foreign operators could and would adopt the same advances and continue their economic superiority because of their lower labor costs. The Panel believes that the period required for foreign competitors to catch up would be a substantial one for the following reasons:

Potential foreign competitors will probably have to pay significantly higher rates for borrowed capital than do U. S. shipowners.

The European merchant fleets have been largely renewed since World War II and are, in this sense, "frozen in" for a period of perhaps ten years.

Low costs of foreign labor make it much less economic to invest in labor-saving devices.

In world competition, no single technological advance can be expected to give an advantage for all time. Continuing research and development are necessary to meet the opponent's challenge.

IV. KEY CONCLUSIONS AND RECOMMENDATIONS

A. PRIMARY CONCLUSIONS

1. In the next ten to fifteen years, by far the greatest percentage of U. S. international tonnage, both of commercial and military traffic, will be carried by sea.

2. United States' control of sufficient merchant shipping to strengthen the economy of the free world and to meet minimum needs during a political-economic conflict is required:

(a) as a military resource if armed conflicts break out,

(b) as a means of exerting positive economic pressures against the Sino-Soviet Bloc,

(c) as insurance against loss of shipping through realignment of allied or neutral maritime nations,

(d) as a means of maintaining access to essential raw materials, and

(e) as a means of protection against exorbitant shipping rates.

3. In the range of possible war situations, by far the most important to U. S. maritime capabilities is the expanding political-economic conflict.

4. Since World War II the United States has carried a decreasing percentage of its own maritime trade.

Although not losing ground in terms of total tons of dry cargo carried, the United States has lost ground in total tanker liftings. At the same time, total lift requirements for both dry cargo and petroleum products are greater. A continuation of this trend is unacceptable to the needs of national security.

5. Full cooperation on the part of management, labor, and technology can provide the United States with a fleet of merchant vessels which will ensure vital lines of communications and will be economically competitive.

6. When such a fleet is built, it should satisfy almost all foreseeable military requirements for a merchant marine except for special military vessels designed for "no port" operations.

7. Full implementation of these recommendations may require revision of the Merchant Marine Act of 1936.

B. SPECIFIC CONCLUSIONS AND RECOMMENDATIONS

1. Conclusion

As a logical successor to the Mariner class, a new prestige class of cargo vessels emphasizing speed and highly mechanized cargo-handling and ship-operating features should be incorporated in the U. S. merchant fleet. Prerequisite to the successful operation of this fleet is the improvement of labor-management practices and relief from statutory and regulatory restrictions on ship design and operations.

Recommendations

(a) The Maritime Administration should initiate the design of a new class of cargo vessels of advanced design with speeds in excess of 20 knots and incorporating the following features:

(1) Use of a unitized system of cargo handling embodying increased mechanization and permitting automation, to reduce stevedoring costs and allow quick turnaround of the ship;

(2) Increased mechanization and some automation of the ship operation, both on the bridge and in the engine room, to reduce crew.

Cargo concentration procedures which reduce ship calls at multiple domestic and overseas ports should be adopted in conjunction with the above features.

(b) Plans should be made to effect the construction of a class of at least six vessels of the design recommended; the Maritime Administration should persuade U. S. flag operators to add these ships to their regular fleets.

(c) As a first step the Maritime Administration should assemble the facts underlying restrictive labor-management practices, and regulations inhibiting the development of a high performance, economical merchant fleet, including the rules of admeasurement, load lines, etc.

(d) Following the presentation of these facts, the Departments of Commerce and Labor should take the initiative in recommending new legislation and labor-management practices.

2. Conclusion

A very substantial portion of U. S. -controlled shipping is now under "flags of convenience". If current efforts to negate this arrangement are successful a flight of substantial dimensions will ensue, removing thereby a dangerously high proportion of currently available tonnage from effective U. S. control.

Recommendation

The United States Government should make every effort to ensure the continuance of the "flags of convenience" agreements.

3. Conclusion

The present system of subsidies may be adequate to permit profitable commercial operation of automated and unitized cargo ships at speeds as fast as 30 knots (depending on range and schedule). A limited number of unsubsidized ships might be economically feasible at premium freight rates.

Recommendation

Further consideration should be given to the construction of additional high speed (greater than 30 knot) passenger ships, and to the development and construction of a limited number of cargo ships of such speed, for possible independent operation to provide rapid response on outbreaks of war.

4. Conclusion

It is technically feasible to build a 40-knot cargo ship for a 3000 to 4000 mile range. Speeds above 40 knots do not appear to be even technically feasible in the near future. The 40-knot cargo ship, even under present subsidy procedures, is not economical from a commercial standpoint.

5. Conclusion

At least through 1965, subject to the continued operation of U. S.-owned shipping under "flags of convenience," there will be no quantitative deficiency of U. S.-controlled merchant shipping for support of limited war.

6. Conclusion

U. S.-controlled merchant shipping is qualitatively deficient for optimum support of civilian and military requirements in a limited war owing to deficiencies in speed, age, rates of, and capacities of unloading systems, and lack of "over the beach" capability.

7. Conclusion

Within the foreseeable future, a limited war situation may require the deployment of U. S. troops by ship over long distances and such forces may be required to land, along with considerable supplies, under "over the beach" conditions.

8. Conclusion

There is a military need under limited war conditions for small (3000 to 5000 ton capacity) high-speed amphibious support ships which are capable of discharging rapidly in small harbors and/or onto beaches.

9. Conclusion

There is substantial compatibility between military interest and commercial operation on desirable ship characteristics: rapid cargo handling and turnaround, increased mechanization of ship operation, and increased ship speed.

Recommendation

Feasibility and design studies, which delineate aspects of common commercial and military utility should be continued in cooperation with the Department of Defense for special purpose ships.

10. Conclusion

The subsidy program which maintains merchant vessels under United States control should be continued until the time its fleet can be made competitive in international trade.

11. Conclusion

None of the many diverse elements comprising the maritime industry and the U. S. Government provide the research and development facilities other major industries have found necessary to ensure their competitive position. Because of the complexity of the problem and the conflicting interest involved it seems unlikely that these problems can be solved without the Government taking a major role. At this time, U. S. ship designers do much ship-model testing abroad, frequently in Holland.

Recommendation

The Maritime Administration should earnestly pursue opportunities for providing coordinated facilities for the conduct of scientific, engineering, and economic research in support of the entire maritime industry. The experience of the National Advisory Committee on Aeronautics will offer helpful guidance in this area.

12. Overall Conclusion and Recommendation

The principal objective of research and development should be to create a United States merchant fleet which can be self-supporting without subsidy.

(Other important conclusions and recommendations of this report appear in the Special Supporting Studies.)

SPECIAL SUPPORTING STUDY NO. 1

LABOR-MANAGEMENT ASPECTS OF AN IMPROVED U. S. MERCHANT MARINE

A. THE NATIONAL PROBLEM

Growing foreign competition with U. S. companies continues to present a problem of increasing importance to the economy of the United States. Along with our high standard of living has come a high cost of management and labor. Industrial activities involving relatively large managerial and labor forces--that is, "labor intensive" industries--have been most affected by such foreign competition. The relatively low cost of management and labor in economies with low standards of living, makes it possible for these economies to produce "labor intensive" goods and services at a low enough cost to undersell domestic producers in the U. S. marketplace.

In order to preserve or expand those U. S. industries which cannot effectively compete against foreign enterprises in a free market, there are essentially two types of action that can be taken--subsidization or cost reduction.

Subsidization may be direct or indirect. Tariffs, for example, are a type of indirect subsidization in which the "bill" is paid directly by the consumer in the form of higher prices for the goods or services involved. Direct subsidies by the Government can be provided through outright grants or payments to cover differences in acquisition costs for capital goods or labor costs (as in the maritime industry), Government contracts, preferential legislation, accelerated amortization schedules, and attendant tax advantages.

A more constructive alternative to subsidization lies in exploiting the United States' ability to invest capital so as to increase the productivity of labor and management as, for example, through mechanization and automation. Mechanization involves the replacement of the human being as a source of energy; automation involves the replacement of the human being as a source of control. Automation, like mechanization, increases the ratio of capital expenditure to the costs of labor and management and utilizes the growing inventories of investment capital which are available in our economy. If the volume of consumption is not increased proportionately to the reduction of labor costs, mechanization and automation may result in a reduction of the requirements for labor (but not necessarily for management). On the other hand, if operating costs are not reduced, foreign competition will produce a reduction in the net requirement for U. S. labor and management. Although the economic history of the United States shows that, in the long run, advantages of mechanization and automation accrue to labor as well as to management and the consumer*, in the short run, labor is the most adversely affected. Unemployment and dislocation of labor occur before an adjustment in the work force can be made. At present there is no planned method employed for offsetting these

*It should be noted that the "consumer" includes both labor and management.

hardships. It is only natural, in the face of these short-run but intensely adverse effects on labor, that labor should adopt attitudes and policies which are opposed to increased mechanization and automation.

It is apparent that the completion of the first industrial revolution (mechanization) and the development of the second (automation) will not be effectively accomplished by either wishful thinking or by permitting the opposing forces to engage in a conflict unregulated relative to public interest. It would seem desirable, therefore, for the Government to recognize its responsibility in this matter by the establishment of an agency to determine ways in which the inevitable transition to increasingly mechanized and automated production may be effected without undue loss to labor. Such activity might be supplemented by similar activity in state and local governments, and within the industries affected. The ultimate objective should be to produce governmental administrative policies and legislation which will be directed toward U. S. national economic and social objectives.

These comments apply to United States industry generally, but appear to be particularly pertinent to the current maritime situation. The alternatives to a positive program in the maritime industry include continuing subsidy of serious magnitude and probable unsatisfactory side effects, or, alternatively, the loss to U. S. labor, management, and capital of a major industry with highly undesirable correlative effects on U. S. security, economy, and international position. Whether a similar or related procedure is now desirable in one or more other industries, it now appears essential in the merchant marine. Hopefully, such a program would establish a pattern that could be followed constructively elsewhere, but this prospect is not needed to underline the significance and urgency in the maritime industry.

At present the Government, through the Maritime Administration and the Department of Defense, is sponsoring one phase of such a program with the active cooperation of management and labor in the port of San Francisco. This work, being conducted by the Maritime Cargo Transportation Conference of the NAS-NRC, embodies research in determining the effects of increased productivity, either through increased mechanization or improved work practices, upon the work force and upon capital effectiveness. The extension of such programs within the maritime industries might well provide a pattern in which trial designs and new practices involving labor and management cooperation could be developed as an important proving ground for advances in the solution of the national problem.

B. THE MARITIME PROBLEM

Within the maritime industry the work force includes numerous occupations ranging from the most menial to high order supervision. Essentially, two groups may be identified within the labor force--seamen and longshoremen. Management may be divided into two sub-groups--the steamship operator and the stevedore--who contract with the steamship operator for the loading and unloading of the ships. The stevedore is, among other things, a labor contractor for the steamship operator.

In contrast to his role as an indirect employer of the longshoreman, the ship operator is the direct employer of seamen. The operator sits at the negotiation table and faces the representatives of the various seamen's organizations.

The Government has not been directly involved in the exchanges during negotiation sessions between management and labor. However, since the introduction of subsidy arrangements in the U. S. maritime industry, the Government has been an unseen

committee member at all negotiations involving seamen and management of subsidized operations. Approximately 75 percent of wage payment is already passed on to the Government.

Present operating subsidy arrangements tend to remove incentive on the part of management to reduce operating costs; such arrangements contemplate that a substantial portion of increasing operating costs will be borne by the Government, without regard to the level to which these costs may rise. Such an arrangement, it would seem, inhibits a positive attitude on the part of management toward technological progress.

At the negotiation table labor desires to retain work opportunity and enjoy a wage scale consistent with the general level of other industries. Management, on the other hand, is faced with increasing costs and declining productivity with their resultant increasing unit costs. Management then is motivated by a desire to reduce its unit costs of providing shipping services.

C. LABOR'S STAKE

Labor has gone on record as not being opposed in principle to mechanization and automation. Labor has also indicated that it expects to receive a fair share of the benefits of automation. There is, however, no unanimity of opinion as to what constitutes a "fair share" and how it shall be passed on to labor.

Reductions in the cost of doing maritime business can be accomplished in two ways--either through an increase in productivity with the present work force and equipment, or through mechanization and automation. In the maritime industry, this simple choice is not entirely applicable. Seamen, for example, cannot improve productivity, per se; if they work harder at their jobs aboard ship, the unit cost of transportation will not be significantly reduced, nor will the number of ships which will be required to perform such services.

Longshoremen, on the other hand, can reduce costs by working harder. However, a program in this direction would be unrealistic. Such a move would represent to the longshoremen a reversion to the old-time "sweatshop" conditions and a loss of gains painfully won over several decades.

D. MANAGEMENT'S STAKE

The reluctance to embrace automation has not been restricted solely to labor. A substantial portion of maritime management has yet to be convinced that the advantages of technological improvement outweigh the increased capital investment required, in light of the uncertainties of the future.

The maritime industry has not been a substantial supporter of research and development; in comparison to other U. S. industries its proportion of gross revenue devoted to research has been small indeed.

Inclination toward technological improvement by management will probably best be encouraged by providing some sort of financial incentive to institute such changes. The exact form of these incentives should be studied. Modification of existing subsidy arrangements suggest themselves as one possible device. For example, the Maritime Administration might grant higher construction subsidies for those vessels which embody automated systems. In operating differential subsidy contracts, the amount of subsidy for conventional ships might be fixed at the level required for automated ships. By such

devices, the Maritime Administration might be assured that a more favorable attitude toward automation would be adopted by ship operators.

E. TRANSITIONAL PROGRAM

It would be premature to suggest specific means by which an effective transition to more mechanized and automated crew and cargo handling procedures might be accomplished. However, on the basis of current experience in dealing with such problems in the Port of San Francisco, and with corresponding experience in Le Havre and Puerto Rico*, certain possible courses of action suggest themselves as being worthy of further study.

1. The development, production, and installation of advanced equipment is usually a protracted process. Wherever possible, the transition should be made gradually so as to take maximum advantage of natural attrition from the available work force. The maritime industry lends itself particularly well to such a procedure since advanced systems must be adopted ship-by-ship and terminal-by-terminal. In view of the high average age of longshoremen in the San Francisco Bay Area (about 53 years) and the small increases to this work force, it is possible that in some areas attrition may be more rapid than can be compensated for by mechanization and automation. This possibility must be considered.

2. If the rate of installation of more mechanized and automated systems cannot economically be restrained to the natural attrition rate, an accelerated retirement program can be instituted and supported by part of the subsidies withdrawn from the operating phases of the shipping industry. In this way a benefit would immediately accrue to labor, and particularly to those workers who have contributed to the industry for the longest periods of time.

3. If even with accelerated retirement the attrition rate is not sufficient, it may be possible to institute a program to retrain and relocate displaced workers within or outside the industry with an eye to the possibility of upgrading the workers affected so that their earning power is increased. Wage insurance for that period of retraining and relocating should be considered as an integral part of the program. Several precedents in principle exist for such a program; for example, public housing legislation requires that persons displaced by construction of new housing projects must be provided with adequate substitute housing to compensate for that which is taken away from them.

4. Those workers who remain in the industry must receive a benefit from the increase in their productivity. This may be accomplished by such things as salary adjustment or increased fringe benefits (or shorter work periods).

This listing is only meant to be suggestive and is in no way restrictive.

F. ECONOMIC FEASIBILITY

If the Government were to continue its current subsidy policy it would aid in the construction and operation of approximately 450 new ships over the next 20 years.

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*The work of Pierre Bonnot, Office of Proportional Wage Studies, Paris, France, in the cases of Le Havre and Puerto Rico; the work of the Maritime Cargo Transportation Conference, NAS-NRC, in the Port of San Francisco.

Most of these would be built in the next ten years. If we conservatively assume that they would be built evenly over the 20-year period, we would have 4500 years of new ship operation to be subsidized. At the current subsidy rate (also conservatively assumed) this would involve $400,000 per ship year in operating subsidies or a total over the 20-year period of approximately two billion dollars.

Funds that could be obtained from the reduction of operating subsidies are of such magnitude as to more than offset such a transitional program. For example, as an unreasonable extreme, consider the following. At present there are approximately 51,000 employed seamen and 72,500 longshoremen employed on both subsidized and unsubsidized operations. Even if a transitional program involved the inconceivable displacement of the entire work force at a cost of $10,000 per man the total cost of this program would be one and one-quarter billion dollars, considerably less than the projected operational subsidy of two billion dollars. Such a transitional program has the additional advantage of reducing the need for further operating subsidies. The additional cost of construction subsidies to cover increased mechanization and automation could be covered at least in part from that portion of the operational subsidies which are freed and not used in the transitional program. In addition, recapture of excess profits on the highly competitive unitized operations would further contribute to reduced net Government expenditures.

This example is meant only to reveal order of magnitude, but it clearly demonstrates the economic feasibility of an extensive transitional program financed by the Government.

G. NECESSARY RESEARCH

A research group should be established in the Maritime Administration to study the labor-management problem outlined herein. The group should consist of competent disinterested researchers. They should be advised by a permanent advisory board appointed by the Maritime Administrator consisting of representatives of the following groups:

Federal Government
State and Local Governments
The Labor Unions Involved
Maritime Owners and Operators

Consultation should also be made available by a competent scientific agency not associated with any of the above-mentioned parties. This agency should serve to review the technical adequacy of any research that is conducted, whereas the advisory board should evaluate the work in process and the results obtained in terms of its feasibility and desirability.

H. RECOMMENDATIONS

A program should be developed by the Maritime Administration, with the active participation of representatives of labor and management, which will be designed to encourage and support the development and installation of technological advances in both the subsidized and the unsubsidized fleets with a minimum of transitional difficulties to all the parties concerned. This program should provide for the continuous dissemination of information to labor and management on the role of the merchant marine in the national economy and in civil and defense mobilization. It is to be hoped

that through such an information program the attitudes of both labor and management towards technological changes might be significantly improved.

Specifically, the program should consider possible changes in current subsidy policies of the Maritime Administration with a view to determining ways in which incentives for developing and instituting technological advances may be provided to labor and management. It should also encourage and support activities by ship and terminal operators together with associated local unions in (a) research and development of advanced technological systems, (b) pilot installations, and (c) full-scale installations of such systems. The Maritime Administration should integrate such specific studies with the development of an overall program for the industry.

In summary, the required changes in maritime practices will have an obvious and significant impact on every aspect of the activities of labor and management. Increased emphasis should be placed on the importance of labor-management problems in technological advancement. A comprehensive study should be performed under the Maritime Administration's supervision by individuals competent in the labor-management field to develop a constructive and practical program for converting the industry from one that is heavily subsidized to one that is more self-supporting and exemplary in its programs for fairly distributing the benefits obtained through advances to all parties involved.

SPECIAL SUPPORTING STUDY NO. 2

TECHNOLOGICAL POSSIBILITIES

A. THE UNITIZED SHIPPING OPERATION

General cargo ships designed for 20-knot sea speed and using currently available unitized cargo-handling systems can operate profitably and without subsidy in competition with foreign flag ships which use conventional cargo handling systems. The designs are based on:

1. Use of a unitized system of cargo handling embodying increased mechanization and permitting automation, to reduce stevedoring costs and to allow quick turnaround of the ship

2. Increased mechanization and some automation of the ship operation, both on the bridge and in the engine room, to reduce crew

3. Cargo concentration procedures which reduce ship calls at multiple domestic and overseas ports should be adopted in conjunction with the above features.

The development of unitized systems of cargo handling is now under way and such systems are being incorporated in a few new ships for the merchant marine. It is considered that these new systems will fulfill the stated requirement of the military services for rapid discharge capability and that they can be adapted to handle military cargo at equally rapid rates.

The basic objective of the designs and systems is to reduce port time and to revise cargo handling methods whereby manual labor by longshoremen in terminals and ships is radically reduced or eliminated. Pre-packed cargo in containers, vans, or on pallets may be moved on or off specially designed ships rapidly and with a minimum of manpower. The use of prestowed units drastically reduces terminal and ship cargo handling time and costs by eliminating the packing of the shoreside vehicle and re-stowing aboard ship, and a repetition of this process at the delivery point. Analysis of loading costs indicates that reductions of 90 to 95 percent are possible as compared with conventional methods. The port time required for cargo handling will be reduced by 75 to 85 percent.

The new designs of unitized cargo ships incorporate features allowing maximum exploitation of containers or pallets or a combination thereof. Complete mechanization, while not yet attained, is feasible. The container ships use large-capacity gantry cranes to lift the units on and off the ship, placing them in final stowed position on the ship without horizontal movement. The high loading rate pallet systems use cranes and elevators to transfer the pallets from the dock to the various decks in the ship, and fork trucks to stow the units in the ship. The essential elements of both methods are:

Large prestowed units
Large capacity high rate handling equipment
Little or no manhandling of cargo
Elimination of dunnage, and a minimum requirement for cargo shoring and securing

The ship required for the unitized cargo system is specially designed to suit the needs of the trade and the cargo system. The basic function of the ship is to carry the cargo efficiently and, in the design, other features may be compromised to meet this requirement. This results in a unitized cargo ship which is somewhat larger, heavier, and initially more expensive than the conventional cargo ship when both are designed to carry the same cargo (weight and cubic) at the same speed. However, fewer unitized ships are required to maintain the same service since the reduction in port time shortens the time for the complete round-trip voyage.

The crew currently used on merchant ships is in excess of that required by Government regulations, and is largely governed by the requirements of the maritime unions. The ships can be safely operated with fewer crew, and minor additions in automatic equipment would permit significant reductions in manpower. Technically, a ship can be operated from a central control point in much the same manner as an airplane, but commercially it is unnecessary to adopt this extreme. It is considered that a reduction in crew from 55 to 35 is now technologically feasible and would make a significant contribution to the economics of the shipping operation.

The most effective use of the unitized system for overseas transport is obtained when the units of cargo are assembled at a minimum number of ports by a land transportation system that is designed for that type of service. The ocean freight customs, conference practices, and government regulations may prevent the effective integration of the service. This sometimes has the effect of requiring ship calls at a number of ports many hours steaming time apart, whereas the cargo could be assembled quickly and cheaply by land transportation. These practices should be modified where necessary to permit economic use of the unitized cargo system.

It is recognized that the adoption of the unitized system of cargo handling presents a labor problem, since the resultant automation will displace longshore labor. Based on successful results in some cases, it is considered that a carefully planned program can be developed to protect the interests of the present civilian longshore force during a changeover period.

The adoption of a unitized system of cargo handling will also present problems in many countries where the passage of containers or unitized cargo through customs is prohibited. Many countries in Europe, and some elsewhere, now permit delivery direct to the consignee, so that precedents for the necessary changes exist.

All cargo on all trade routes cannot be unitized. However, where studies of cargo characteristics on specific routes have been made, they have shown conclusively that a majority of the cargo can be unitized, and that an additional substantial portion can be handled rapidly, and that with proper design the remaining small quantities of "rough" cargo can be handled expeditiously with the heavy lift equipment that may be required for the unitized system.

In order to obtain a clearer picture of the possibilities of the unitized cargo shipping operation, a comparison of system characteristics and costs is included in Table II. For comparative purposes it is assumed that a capacity for 10,000 tons of cargo per week is to be provided on a 3000 mile route (roughly trans-Atlantic) with equivalent services to be furnished by a conventional ship fleet and by a container ship fleet.

The weekly schedule will require three conventional ships of 20-knot speed spending 12.5 days at sea and 8.5 days in port per round trip, or two container type ships of 21-knot speed spending 12 days at sea and 2 days in port per round trip. The cost of each container ship is about one million dollars more than its conventional counterpart, and each container ship requires 700 containers on the ship, plus another set at each end of the route, or a total of 2,100 containers costing about $4,200,000. However, the capital cost of the two-ship container fleet is slightly less than that of the three-ship conventional fleet.

The statistics presented show that for this short haul service, cargo handling costs represent 69 percent of the total transportation costs for the conventional ship, about 36 percent for the subsidized container ship, but only 13 percent for the automated unsubsidized container ship. It should be noted that the unit transportation cost is reduced by about 45 percent using the unitized system.

An estimate of revenue has been made in order to compare returns on investment in the three cases. Under the conditions assumed, the conventional ships earned less than five percent on the owner's investment and none on the Government contribution. However, the unitized ships earn a substantial return, 34.8 percent on the subsidized operation, and 18.3 percent on the unsubsidized but automated operation. The Government would recapture sufficient excess profits from the unitized subsidized operation to cover operating subsidies and to repay the construction differential subsidy in a reasonable time.

Similar estimates have been made to show that the unitized operation is profitable at greater distances, up to 12,000 miles round trip.

TABLE II

COMPARISON OF CONVENTIONAL, UNITIZED, AND AUTOMATED SHIPPING OPERATIONS

Ship Type	Conventional	Unitized	Unitized and Automated
Type Operation	Subsidized	Subsidized	Unsubsidized
Fleet Capacity, tons cargo per year	1,000,000	1,000,000	1,000,000
Number ships	3	2	2
Number crew, each ship	55	55	35
Cost in U.S., Millions			
Each ship	12.3	13.4	13.4
Containers per ship	0	4.2	4.2
Fleet	36.9	35.2	35.2
Operating Costs - $1,000/year			
Crew wages	125	125	400
Crew subsistence	50	50	32
Stores and Supplies	45	45	45
Maintenance and Repair	100	107	110
Fuel	385	590	560
Port charges	32	24	24
Insurance	92	96	111
Subtotal	829	1,037	1,282
Ship amortization (5%-20 years)	490 (g)	540 (g)	1,080
Container amortization (f)	0	535 (g)	715
Total per ship	1,319	2,112	3,077
Fleet Cost - Millions/Year			
Operating	3.96	4.22	6.15
Cargo handling (a)			
Stevedore	6.90 (b)	1.10 (c)	.25 (d)
Other cargo expense	1.62 (b)	0	0
Claims	.20 (b)	0	0
Filling containers	0	1.30 (b)	.65 (e)
Total transportation cost	12.68	6.62	7.05
Unit transportation cost, cents per ton mile	.62	.33	.35
Revenue at $20 per ton, in millions	13.5	13.5	13.5
Profit - Millions	.82	6.88	6.45
Investment - Millions	18.5 (g)	19.7 (g)	35.2
Return on investment - (percent)	4.45	34.8	18.3

(a) Based on 85% full one direction, 50% the other = 675,000 tons per year.
(b) Based on study "Maritime Transportation of Unitized Cargo" prepared by Maritime Cargo Transportation Conference, NAS-NRC, June 1959.
(c) Based on one longshore gang per container crane.
(d) Based on automated cranes.
(e) Based on 50% cargo prestowed by shipper.
(f) Based on 5% interest, 10 years, plus 4% maintenance and repair.
(g) Based on 50% subsidy on ships and 25% on containers.

B. HIGHER SHIP SPEEDS

The highest speed used at present by cargo ships is 20 knots. The present system of subsidies may be adequate to permit profitable commercial operation of automated and unitized cargo ships at 30 knots, depending on size, range, and schedule. A limited number of these ships might be commercially feasible at 3000 to 4000 mile range carrying express cargo at premium rates. It should be noted that the trans-Atlantic superliners under conference regulations charge a 25 percent premium for the fast freight service which they offer.

It is technically feasible to build a 40-knot cargo ship for a 3000 to 4000 mile range. Speeds above 40 knots do not seem feasible in the near future without a substantial research and development program. The 40-knot ship is not economical from a commercial standpoint, even with the usual subsidies.

C. SPECIAL SHIPS FOR ROLL-ON, SMALL-HARBOR, OR OVER-THE-BEACH USE

There appear to be two needs of the military services for limited war readiness that are not being met qualitatively by the merchant marine, (a) a satisfactory method of carrying and discharging wheeled and tracked vehicles, and (b) a small ship (length 450 feet, draft not over 20 feet, capacity 3000 to 5000 tons) that can be used to transport cargo overseas at a good speed (20 knots) and discharge rapidly (in eight hours) in small harbors and/or over beaches having slopes steeper than 1 to 15. (This ship type is not to be confused with military beaching ships--for example, the LST's which are considered to have no commercial utility.)

It is possible that the container ships being built by commercial interests could be modified for the carriage of wheeled vehicles provided this capability is given consideration in the design stage. Otherwise, the military services should determine the need for carrying vehicles on commercial ships by the roll-on, roll-off method and if considered essential, the Maritime Administration should make every effort to include the roll-on, roll-off capability as a national defense feature in the cargo ship replacement program.

Also, possibly, the commercial container-type ship which is fitted with heavy-lift gantry cranes could be used to transport small preloaded barges for direct transfer of cargo to the beach.

There are small (2000 cargo deadweight tons) unitized cargo ships under consideration for domestic service, and while the characteristics are different from those desired by the military services, the basic elements of size and capacity are similar. It appears possible that a compromise design could be made that would be commercially feasible (possibly with some national defense assistance) and would also meet military desires.

D. STANDARDIZATION

American shipbuilding costs could be reduced somewhat if standardization were adopted to a greater extent. Standard ship designs, while of some benefit, are not particularly recommended because of their inability to satisfy any given owner's requirements, and their tendency toward freezing the state of the art. On the other hand, standardization of such components as machinery, accommodations, and navigation equipment appears to be a feasible method of reducing costs.

SPECIAL SUPPORTING STUDY NO. 3

MARITIME RESEARCH AND DEVELOPMENT PROGRAM*

A. GENERAL CONSIDERATIONS

Research and development activities of the Maritime Administration should be directed toward two objectives: (a) developing a self-supporting U. S. merchant marine which can compete successfully in the world market, and (b) developing a U. S. merchant marine which will be of the greatest possible use, compatible with commercially sound operations, for national defense purposes under limited war conditions.

In view of the relatively high wage standard in the United States, the most promising prospect of attaining objective (a) lies in increased mechanization, or automation, to reduce to a minimum the manual labor involved both in ship operation and in cargo handling.

Another approach to attaining a competitive status is through reducing maintenance and maintenance personnel by using improved materials such as plastic joiner surfaces, new protective coatings, non-corrosive metals, etc. Forward-looking operators are vigorously exploring this field, but Maritime Administration research can help.

A third possibility of attaining a competitive status relative to foreign merchant fleets is through higher speed, because of its tendency to attract business. However, speed is expensive, and it may be presumed that competing fleets operate at what their analyses show to be the most economical speeds. Nevertheless, Maritime Administration research should include the development of hull forms and propulsive plants suitable for higher sustained sea speeds, and a study of the economic feasibility of these higher speeds.

As regards the second objective (military usefulness of the U. S. merchant marine), maritime research and development should be directed toward determining, and improving where possible, the commercial utility of the special features and designs by the military services in merchant ships.

The following more detailed recommendations are in line with the preceding general considerations:

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*Because the contents of this special study parallel in many respects the over-all research advisory responsibilities of the Maritime Research Advisory Committee, it is pertinent to repeat that the recommendations of this study, having the status of recommendations to the Maritime Research Advisory Committee, are subject to that Committee's review prior to inclusion in its forthcoming advisory report to the Maritime Administration.

B. RESEARCH PROJECTS

It is recommended that the Maritime Administration actively sponsor the following projects, which are listed approximately but not rigidly, in order of priority.

1. Toward Objective (a): Ability to compete in the world market

(a) A detailed and extensive study of the extent to which it is practicable to unitize general cargo (with pallets, containers, etc.) in various specific trades.

(b) A study of the means of automated handling of unitized cargo into and out of the ship, the objective being both faster handling (quicker turnaround) and reduction of manpower (reduced cost). Such studies would have to be tailored to specific trades and cargoes, and should consider military utilization.

(c) Studies of the over-all economies in time, numbers of ships required, and costs per ton-mile resulting from the unitization and automation found practicable in items (a) and (b).

(d) Continuous review of cargo handling research work by others, including that of the U. S. Navy, Military Sea Transportation Service, U. S. Army Transportation Research and Engineering Command, U. S. Air Force, U. S. Marine Corps, and private U. S. and foreign groups.

(e) Studies of the practicability of automation of control of ships and propelling (or other) machinery, with the objective of reducing the number of crew. (This has been done successfully with both diesel and steam machinery).

(f) Pursuit of continuing studies for reducing ship construction costs by changes in design of hull and machinery, in construction details and in standardization of components.

(g) Operating-cost studies of the commercial feasibility of high-speed express cargo service (unitized cargo, 20 to 30 knots) on certain routes at premium rates.

(h) A continuing study of the optimum balance between machinery weight and cost, and fuel weight and cost for various types of power plants (i. e., steam turbines, gas turbines, nuclear power) with special reference to higher speed ships.

(i) A continuing study of improved hull-forms for higher sustained speed.

(j) Design and construction of an aluminum cargo ship, in order to work out the design, structural, and construction problems involved, aimed at the eventual use of aluminum in making large fast ships more feasible.

(k) Support of fundamental research (by others) on the loads experienced by ships at sea, with the objective of developing more structurally efficient, and therefore lighter and cheaper, hulls.

(l) A continuing surveillance and evaluation of new and novel types of sea vehicles, with comparative studies of their technical capabilities, but with no original experimentation unless such studies indicate real promise.

2. Toward Objective (b): Military usefulness

(a) Establishment of a special top-level project to seek areas of agreement between commercial and military interests, and also within the commercial operator groups, with respect to cargo handling systems adaptable to military use.

(b) Collaboration with the military services to determine whether national defense features (for example, increased generator and distiller capacity) are being called for in more ships than are necessary or desirable.

(c) A review with the Department of Defense of the national defense cargo and weight handling criteria for general cargo ships, to determine whether these criteria are consistent with the weight and amount of Department of Defense heavy-lift cargo.

(d) Determination of the military need for carrying wheeled vehicles on commercial ships by the roll-on, roll-off method as compared with specially adapted lift-on, lift-off vessels. This affects the need of including roll-on, roll-off capability as a national defense feature in the cargo ship replacement program.

(e) Development of a design, in collaboration with the military services, of a small (3000 to 5000 deadweight tons) 20-knot vessel, capable of discharging rapidly in small harbors and/or onto beaches, which would be useful both commercially and for amphibious support.

(f) Collaboration with the military services in the design of submarine tankers, and of submersible barges pushed or towed by combatant submarines, as necessary to permit eventual operational evaluation of such craft by the military services.

(g) Cooperation with the military services in determining the need and feasibility of anti-submarine warfare features on commercial vessels.

(h) Collaboration with the military services in the design of high-speed commercial tankers readily convertible to fleet oilers.

3. General

(a) It is recommended that a team of legal and technical personnel be established to review all laws and regulations pertaining to the U. S. merchant marine, including the 1936 Act, to determine whether and in what respects they impede technological progress, and if so, what changes should be made to remove such impediments. (For example, it seems desirable to modify existing subsidy and recapture clauses so as to favor faster ships.)

(b) It is recommended that in its research planning the Maritime Administration keep in view the Long-Range Research Program in Ship Structural Design, a report prepared by Lewis and Gerard for the NAS-NRC Committee on Ship Structural Design (Experimental Towing Tank Report 703, Stevens Institute of Technology, December 1958).

(c) Serious consideration should be given by the Maritime Administration to the establishment of a new comprehensive maritime research center, to further both technical and operational research of the sort suggested above. (Present costs at the David Taylor Model Basin result in most commercial testing work being sent to European tanks by U. S. designers.)

B. IMPENDING LOSS OF "FLAGS OF CONVENIENCE" SHIPPING

U. S.-owned ships registered under the flags of Liberia, Panama, and Honduras are considered by the Department of Defense to be second only to U. S. flag ships in availability and reliability for wartime use. This fleet is an important defense asset and comprises roughly one-third of the number of active ships under U. S. control. The continued availability of these ships for defense purposes is seriously threatened. (See Special Supporting Study No. 9 for further discussion of this matter.)

C. ANTICIPATED AVAILABILITY OF FOREIGN FLAG SHIPPING

In the event of a NATO war, the United States can expect that the shipping capabilities of other NATO members will be available to a limited degree--and in general on a reciprocal cross-servicing basis. See Section D below with regard to agreed-upon procedures for the pooling of merchant shipping. Additionally, friendly neutral countries may find it to their advantage to join in the NATO pooling of merchant shipping.

Should the United States become engaged in limited war, the extent to which the service of friendly foreign flag shipping could be obtained on a charter basis to support our emergency objectives may be seriously restricted by international considerations. Even though many foreign shipowners would welcome the opportunity of employing their ships at lucrative rates, their governments might deny them such opportunity for fear of aggravating a critical situation.

In this connection we should bear in mind that in 1958 only 12 percent of our foreign trade was carried in ships under the U. S. flag and about 33 percent in U. S.-owned and controlled ships under "flags of convenience". Thus, we already rely on foreign controlled shipping resources to meet 55 percent of our ocean shipping needs.

D. THE NATO POOL OF MERCHANT SHIPPING

NATO nations have agreed to commit the preponderance of their merchant shipping to a common pool in the event of a NATO war. A number of nations, including the United States and the United Kingdom, have reserved certain shipping for specific national military purposes. The NATO shipping will be allocated by the Defense Shipping Authority (DSA), functioning through the Washington and London branches of its Defense Shipping Executive Board (DSEB).

It is not expected that the DSA and DSEB will become fully operational until 60 to 90 days after the outbreak of a war involving NATO. Pending their activation it is agreed that each nation will take control of all shipping under its own flag and so employ it as to best further the common effort.

It is probable that the combined shipping requirements of individual nations will exceed the combined capabilities of the NATO pool. Consequently, in meeting U. S. requirements for ocean shipping, primary reliance will have to be placed on shipping under direct U. S. control, particularly in the early phases of a NATO war.

Once NATO pooling and allocations become effective, the primary benefit to be derived will be optimum utilization of shipping, not an increase in shipping availability. For example, a Dutch ship that happens to be opportunely located could be used to move a U. S. cargo from South Africa to the United States concurrently with the movement in an opportunely located U. S. flag ship of a Dutch cargo from South America to the Netherlands.

C. ORGANIZATION AND PROCEDURES

This Panel endorses the recommendations regarding research organization and procedures made by the Maritime Research Advisory Committee in its summary report dated July 1959:

"The Committee has given serious thought to the question of how the Maritime Administration might best implement an expanded research program. The unanimous decision of all members is that:

"(a) All presently decentralized research activities, including nuclear, should be brought together under the direction of a single individual whose task it would be to initiate, monitor and coordinate long-range research projects and to collaborate closely with the operating units in any of their research-related work. This individual should carry appreciable authority within the Maritime Administration. He should report directly to the Maritime Administrator and should be responsible for budget, fiscal and administrative control of all Maritime Administration research and development work.

"(b) Research should be effected through outside contracts administered by the above-indicated director of research. He should be assisted in this by a research staff composed of imaginative and knowledgeable men with abilities in a wide variety of disciplines. Emphasis should be on quality of personnel, rather than quantity."

SPECIAL SUPPORTING STUDY NO. 4

FOREIGN SHIPPING RESOURCES

A. MERCHANT FLEETS OF THE WORLD

A large portion of the world's shipping is owned or controlled by the fifteen governments including the United States which are members of NATO. NATO nations control 66 percent of the ships of the world, representing more than 70 percent of the total world tonnage. The U. S.-controlled proportions of these are 21 percent and 27 percent, respectively. (Almost half of the U. S.-controlled tonnage is laid up in the reserve fleet.) In addition, the balance of the world fleet is mainly held by friendly countries, such as those of the British Commonwealth, South America, and Japan.

At the present time, about five percent of the world's tonnage is controlled by the Sino-Soviet Bloc, which has plans for increasing its tonnage. An additional two to three percent in the hands of certain neutral countries cannot be counted on as support for the free world.

Although the preponderance of world tonnage would be available to the free world now in the event of an armed attack against a member of NATO, the possibility of a non-NATO war and of changing alliances in the future strongly indicate that the United States should not allow its share of the world's tonnage to decline--particularly since active shipping under the U. S. flag represents only nine percent of the total world tonnage. (See Tables III through VI for a summary of world fleet tonnages.)

E. CONSEQUENCE OF PURCHASING FOREIGN-BUILT SHIPS

The purchase of foreign-built merchant vessels at substantially less cost than identical U. S.-built vessels is appealing to all shipowners. Nevertheless, the U. S. shipbuilding industry has been sustained by Navy construction and by the requirements that if U. S. flag ships are to be operated in (a) the domestic trade or (b) the foreign trade with subsidy, they must by law be built in the United States.

The cost differentials are so great that if there were no legal restrictions to foreign purchase nearly every merchant ship of any size for U. S. flag operation would be built abroad. U. S. merchant shipbuilding in peacetime would be confined to small craft, including barges, minor conversions, and mandatory repairs to merchant ships. Presumably, the only construction done in private yards would be that for Navy account.

Cost differentials notwithstanding, the lessons of two world wars have taught us that we must maintain in peacetime a sizable nucleus of shipyard facilities and skills. The requirement that coastal ships be built in U. S. yards should most certainly be continued. Moreover, if the U. S. maritime industry is to become competitive, it is essential that merchant ships of advanced design continue to be constructed in the United States.

Should the United States turn to foreign construction for future merchant ships, thousands of trained shipyard personnel would be displaced from shipbuilding rolls. Private shipyards would continue to perform their contractual allocations of naval construction. However, the knowledge, experience, plant, and equipment investment in commercial construction practices would be lost with no hope of revival if they should be required for mobilization.

The loss of commercial ship construction would affect supporting industries such as the ship design, marine propulsion, auxiliary equipment and communications. The mobilization capability for repair and maintenance work would be reduced. True, shipyards would continue to possess a capacity for expansion from naval repair work. However, the standards of naval and commercial repair are different and the adoption of commercial practices in an activity experienced only in naval work would result in delay in the event of war. At the same time, foreign construction would require standardization of design specifications and provisions to ensure availability of repair parts to avoid maintenance problems arising from a myriad of different types of machinery and lack of spares in an emergency.

Even the commercial ship repairs would probably drift toward the foreign shipbuilding nations, cutting further into the ship-repair capability of the United States.

F. CONSEQUENCE OF USING FOREIGN CREWS ON U. S. FLAG SHIPS

The use of foreign crews would reduce the reliability of U. S. flag ships in an emergency. This would arise from the mixed allegiance of the foreign crew. The unpredictability of the extent of the support of our allies at some future date under an untold variety of limited war conditions may be reflected in changed degrees of dependability of foreign crews and thus limit U. S. freedom of action. An acknowledged weakness in the reliability of U. S.-owned "flag of convenience" ships is the crewing of such ships primarily by foreigners.

Were foreign crews employed on all ships of the U. S. flag merchant fleet, approximately 51,000 U. S. merchant seamen would be adversely affected with serious political and economic consequences. Moreover, they would soon be lost as a wartime maritime reserve. At the same time, such action would probably not serve to reduce the costs of operating ships under U. S. flag because U. S. maritime labor unions would immediately organize the crews under U. S. standards of wages and working conditions.

G. CONCLUSIONS AND RECOMMENDATIONS

1. Except for the continuation phase of a NATO war, the extent to which the United States can rely on foreign-controlled shipping in an emergency is unpredictable. To meet minimum import and export needs, primary reliance must be placed in ships under direct U. S. control.

2. In order to achieve a commercially competitive U. S. maritime industry, the United States requires both competitive ships and the capability to build and maintain them. Accordingly, subsidized ships of advanced design should continue to be constructed in the United States as a matter of national policy.

3. Emergency requirements for shipbuilding capability also justify continuation of the requirement that domestic trade ships be built in the United States.

4. The reliability in an emergency of U. S. -owned "flag of convenience" ships could probably be improved by employing masters, engineers, and other key officers who are U. S. citizens. The Maritime Administration should investigate the feasibility of such action.

5. The utilization of foreign crews on U. S. flag ships is not recommended, because of their unreliability in emergencies and because no significant reduction in operating costs would result therefrom.

TABLE III

MERCHANT FLEETS OF THE WORLD

DWT: Deadweight, thousands of long tons
GT: Gross Registered Tonnage in thousands

Country	Total		Combination Passenger and Cargo		Freighters		Bulk Carriers		Tankers	
	No.	DWT	No.	GT	No.	DWT	No.	DWT	No.	DWT
U. S.[1]	3,047	33,565	288	2,763	2,306	23,754	41	578	412	7,283
Other NATO Countries	7,710	71,856	601	5,533	4,936	36,124	483	3,986	1,690	28,123
Effective U. S. Control	518	10,318	7	62	135	1,332	81	1,556	295	7,400
Sino-Soviet Bloc	971	5,137	81	439	716	3,624	54	227	120	961
Quasi-Neutral[2]	487	2,836	32	121	407	2,286	20	103	28	328
Other[3]	4,373	38,362	271	1,381	3,079	21,123	261	2,608	762	13,534
Total All Flags	17,106	162,074	1,280	10,299	11,579	88,243	940	9,058	3,307	57,629
	Percent of Total All Flags									
U.S.	18	21	22	27	20	27	4	6	12	13
NATO Countries	44	44	47	54	43	40	51	44	51	48
Effective U. S. Control	3	6	1	1	1	2	9	17	9	13
Sino-Soviet Bloc	6	3	6	4	6	4	6	3	4	2
Quasi-Neutral	3	2	3	1	3	3	2	1	1	1
Other	26	24	21	13	27	24	28	29	23	23
Total	100	100	100	100	100	100	100	100	100	100

[1] Includes Reserve Fleet figures.

[2] Includes vessels registered in Yugoslavia, India, Finland, Indonesia.

[3] Includes countries of South America, Africa, Middle East (except Turkey), Far East, and British Commonwealth (except U. K., Canada, India).

(Based on Department of Commerce publication Merchant Fleets of the World as of July 1, 1959.)

TABLE IV

SHIPS OF NATO NATIONS*, July 1, 1959 (Tonnage in thousands)

	Total		TYPE							
			Combination Passenger and Cargo		Freight		Bulk		Tankers	
Country	No.	DWT	No.	GT	No.	DWT	No.	DWT	No.	DWT
U. K.	2,526	24,881	192	2,471	1,493	12,644	258	1,560	583	9,053
Canada	66	275	29	89	17	71	3	9	17	168
Belgium	87	857	10	106	61	477	3	34	13	253
Denmark	355	2,888	26	84	259	1,551	5	25	65	1,241
France	630	5,575	61	601	385	2,368	42	246	142	2,634
Greece	343	3,274	23	120	273	2,584	16	83	31	548
Iceland	17	64	3	7	13	43	-	-	1	17
Italy	697	6,448	80	731	433	3,304	36	385	148	2,355
Netherlands	578	5,539	74	669	362	2,879	17	276	125	1,831
Norway	1,313	14,911	31	132	733	5,079	54	810	495	8,952
Portugal	85	537	19	170	57	267	-	-	9	144
Turkey	130	689	29	134	91	503	2	5	8	95
W. Germany	883	5,918	24	219	759	4,354	47	553	53	832
TOTAL	7,710	71,856	601	5,533	4,936	36,124	483	3,986	1,690	28,123

*Excluding U. S.

TABLE V

FOREIGN FLAG SHIPS UNDER EFFECTIVE U. S. CONTROL
July 1, 1959

TYPE	NO.	DWT (thousands)
Dry Cargo	216	2,888
General	119	1,272
Bulk	81	1,556
Reefer	16	60
Passenger Cargo	7	30
Tankers	295	7,400
TOTAL	518	10,318

TABLE VI

SHIPS OF U. S. S. R. and SATELLITES, JULY 1, 1959

Country	Total		Combination Passenger and Cargo		Freight		Bulk		Tankers	
	No.	DWT	No.	GT	No.	DWT	No.	DWT	No.	DWT
Albania	2	6	-	-	-	-	2	6	-	-
Bulgaria	10	51	-	-	10	51	-	-	-	-
Czechoslovakia	6	66	-	-	5	46	-	-	1	20
Germany - East	18	141	2	14	14	101	-	-	2	23
Hungary	6	9	-	-	6	9	-	-	-	-
Poland	102	635	2	23	84	530	10	29	6	61
Rumania	8	40	1	7	7	38	-	-	-	-
U. S. S. R.	819	4,189	76	395	590	2,849	42	192	111	857
TOTAL	971	5,137	81	439	716	3,624	54	227	120	961
				NEUTRAL NATIONS						
Yugoslavia	104	693	6	23	89	578	3	27	6	60
Finland	225	1,067	7	15	184	751	17	76	17	234
India	127	982	10	51	115	902	-	-	2	23
Indonesia	31	94	9	32	19	55	-	-	3	11
TOTAL	487	2,836	32	121	407	2,286	20	103	28	328

SPECIAL SUPPORTING STUDY NO. 5

SPECIAL CARGO SHIPS FOR MILITARY PURPOSES

A. INTRODUCTION

For some years, the Departments of the Army and Navy have indicated a need for special types of cargo ships to meet certain wartime transport requirements and terminal operating conditions. The Navy's primary requirement is for ships to support the Marine Corps' modern amphibious methods and has resulted in the development of the Amphibious Transport Dock (LPD) and Amphibious Assault Ship (LPH). The Army's requirement is for ships which can rapidly deliver the large tonnages of wheeled and tracked equipment involved in the initial deployment of troop units and for ships which can discharge their cargo directly to the beach under conditions where no ports are available. The Marine Corps also indicated a requirement for the latter type ships.

B. MILITARY REQUIREMENTS

1. Requirement for Rapid Reaction.

(a) Importance. To meet military requirements, rapid reaction, particularly in limited war situations, can well mean the difference between a possible war situation which does not erupt and one which does. There is little doubt that current types of conventional merchant shipping are too slow in speed, and too slow in loading and discharging rates to be fully responsive to the military requirement for rapid reaction. A limited war crisis could well become a race against time to evacuate nationals, to redeploy forces, or to augment and resupply existing forces overseas. Rapid response would be essential. In order to be prepared, modern, high-speed merchant ships of all types are needed. Actually, a suitable capacity for rapid response will contribute significantly to limited war deterrence.

(b) Time Estimates. It is probable that limited war will occur in relatively backward areas where port facilities may be lacking or at best limited.

"Over the beach" discharge is considered likely, at least during the initial seizure phases, in an active combat situation. Port facilities, as available or as developed, will certainly be utilized to the maximum to expedite unloading operations of other forces deployed, and particularly for resupply shipping.

Even assuming availability of adequate port facilities it requires approximately five days to off-load a present-day cargo ship. An equal time is required for loading. In this area alone there is a possibility for much improvement, which in turn would result in faster reaction and reduced turn around. By development and use of efficient and rapid cargo handling facilities aboard ship together with unitized cargo practices, and employing roll-on, roll-off or other satisfactory methods for handling vehicular cargo, it should be possible to reduce load and discharge times to about one day on each end.

(c) Speed. The average speed of cargo ships is about 16.5 knots. Any improvement in sustained speed will, of course, reduce the reaction time and more closely satisfy military requirements. For example, an increase of ship speed from about 16.5 knots to 20 knots reduces elapsed sea time by about 18 percent. An increase in ship speed from 16.5 knots to 30 knots reduces sea time by about 45 percent.

(d) Results. It follows that a combination of decreasing in-port time (both loading and discharge) and increasing sustained speed would contribute significantly to making ocean shipping more responsive to military requirements.

Over a distance of 7800 nautical miles, a combination of increasing sustained speed to 20 knots and reducing total load and discharge time from ten days to two days would result in a 38 percent saving in time. A combination of increasing sustained speed to 30 knots and reducing load and discharge time to two days would result in a 56 percent saving in time.

The true results of such increases in ship speed and improvements in load and discharge times may not be measured until U. S. military forces are required to deploy into a troubled area. The capital investment in such improvements to provide these forces with a rapid reaction capability could well be an insignificant amount, if it results in prevention of an open war situation.

2. Magnitude of Military Transportation Requirements. While this supporting study is addressed primarily to the qualitative aspects of U. S. merchant marine response to military transportation needs, it is nevertheless appropriate to make a broad examination of requirements and capabilities on a quantitative basis. It is believed that limited war conditions constitute the most valid basis for estimating wartime requirements for U. S. merchant shipping. Special Supporting Study No. 6 discusses problems associated with estimating U. S. shipping requirements and capabilities for general war. This supporting study compares requirements and capabilities under specific assumed limited war conditions.

(a) Considerations. No distinction is made between atomic and non-atomic limited war conditions in determining shipping requirements.

Military lift requirements are based on current forces-in-being and present deployment plans under conditions where war is commenced without prior mobilization.

The current inventory of U. S. -controlled merchant shipping is not expected to undergo a significant quantitative change during the period 1960 to 1965 (subject to success in retaining "flag of convenience" shipping under effective control).

No attempt is made to forecast merchant marine shipping attrition rates in the event that sea lanes are interdicted. (Project WALRUS assumed that a significant attack on our sea lanes would force a limited war into a general war.)

It is assumed that optimum planned utilization of available airlift capabilities will be made.

The evaluations are based on total global requirements for U. S. military transportation in the event of war in any area, to include movements between the United States and all overseas areas, among overseas areas, and within each individual overseas area.

Analysis of total U. S. military and civilian shipping requirements indicates that military shipping requirements comprise about 60 percent of the total, and civilian about 40 percent.

Requirements which can be satisfied by the U. S. Navy Service and Amphibious Forces are not considered.

(b) Comparison of Lift Requirements and Capabilities. Based on the foregoing considerations, a separate detailed analysis indicates that merchant-type shipping under U. S. control is quantitatively adequate to meet expected sea transportation requirements in the event of limited war. There are serious qualitative deficiencies, however, particularly with respect to age, speed, and cargo-handling capabilities of individual ships.

(c) Appraisal of Type Cargoes in Cargo Lift Requirements. A broad discussion of dry cargo requirements, without breakdown into major categories, is considered insufficient to properly determine the ship types needed to support such lifts. Therefore, the following figures provide an analysis of the various types of cargo handled in military deployments and resupply operations:

BREAKDOWN OF MILITARY DRY CARGO REQUIREMENTS
(Percentage of Total Measurement Tons)

General Cargo	Special Lift*	Reefer	Vehicle (wheeled/tracked)	Ammunition	TOTAL
50	8	7	25	10	100

*A special lift is an item with any dimension greater than 8 ft. x 8 ft. x 32 ft. or weighing more than 90,000 pounds.

Next to general cargo, the most significant type is vehicular (wheeled or tracked) cargo. Of the total dry cargo lift requirement, vehicular cargo amounts to about 25 percent. This percentage of vehicle to total dry cargo is the average military requirement for the duration of a limited war. The Army and Marine Corps express the need for the following percentages of wheeled and tracked vehicles to other dry cargo requirements in their initial unit deployments:

Army	90 to 95 percent
Marine Corps	50 to 55 percent

It is therefore important that special attention be given to loading, stowing, and off-loading techniques for vehicular cargo. In effect, vehicles should be considered separately from other dry cargoes.

C. ROLL-ON, ROLL-OFF SHIPS

1. General. Roll-on, roll-off ships are especially designed to permit the loading, discharging, and storage of vehicles under their own power without the aid of cranes or ship's gear. As indicated above, Army interest in such ships derives from the fact that 25 percent by volume of Army cargo in both peace and war consists of wheeled and tracked vehicles and that in the deployment of combat units as much as 95 percent of the initial tonnage consists of vehicles.

A prototype military roll-on, roll-off ship, the USNS COMET, built by the Navy at the Army's request, has been in operation since early 1958. Experience with the COMET to date has shown that roll-on, roll-off shipment of vehicles results in considerable savings in terminal manpower requirements, in-port time, vehicle processing cost and cargo damage. It was also found that, through variations in deck heights in accordance with the size of the different classes of vehicles used by the Army, the COMET accommodates considerably more vehicle cargo than conventional ships of equivalent size, thus delivering far more cargo per ship operating day.

2. Wartime Military Roll-on, Roll-off Ship Requirements.

(a) Political-Economic War. Under present day conditions roll-on, roll-off ships are useful in the delivery of replacement vehicles to U. S. forces overseas. The current military cargo shipping rate is approximately one million measurement tons per month, some 25 percent of which consists of vehicles. This volume would suffice to keep three to six COMET type ships in operation.

(b) Limited War. Under conditions of limited war the most urgent requirement is for means of rapidly deploying combat units to danger areas. Any Army task force contains large numbers of vehicles; an infantry division has over 8000; an armored division, over 5000. Studies of theoretical troop deployments to various points on the globe have proved the worth of roll-on, roll-off vessels in reducing over-all ship requirements and condensing the time required to place a specific force ashore. Where discharge port facilities are at a premium, as they are in many of the areas of the world where limited wars are likely to occur, the greater vehicle carrying and discharging capacity of roll-on, roll-off ships of the type of the COMET is of special importance. For instance, the worth of a ten-day reduction in total delivery time for a Strategic Army Corps (STRAC) force can be evaluated only after the fact, if ever; but with the possibility of a general nuclear war growing out of a limited war which was not checked in time, it should be weighed with extreme care. For these reasons the Army has stated a requirement for 25 roll-on, roll-off ships which could carry a major portion of the initial equipment of two divisions of the STRAC.

D. BEACHING-TYPE SHIPS

1. Background. Military ships which discharge their cargoes directly to the shore without the aid of prepared terminal facilities or lighters came to the fore during World War II. The best known example of this type is the LST. The need for such ships stemmed from the nature of the island warfare in the Pacific and, in the Normandy invasion, from the fact that the enemy held the ports.

2. The Beaching Ship Concept. A new use for beaching-type ships arose after World War II when military planners looked for methods of supporting oversea forces in a war in which nuclear attack might be used. The assumption was that in such a conflict, ports and other fixed terminal facilities would be destroyed or denied by the threat of long range mass destruction weapons. The technique of landing heavy equipments and the bulk of supplies by landing (beaching) type ships is considered by the military services to offer the most efficient method for supporting tactical operations ashore under such conditions. The following points contribute to the desirability of this type ship:

Significant quantities of cargo can be discharged directly "over the beach" in minimum time.

Landing and cargo discharge operations can be conducted around the clock under most weather and surf conditions.

The need for lighterage is eliminated.

An efficient "over the beach" out-loading capability is provided.

Studies of the subject resulted in recommendations for the development of a high speed beaching-type ship with very long bow or stern ramps which could beach and discharge either by conveyors or by means of cargo vehicles run aboard from the beach. The potential of such a ship as a rapid turnaround resupply vehicle was found to be considerable. The state of the art in materials handling certainly permits such ships to deliver several thousand tons of cargo in this manner in under eight hours.

There are drawbacks, however. The need for minimizing the LST's beaching draft demands a full hull form. Thus the power requirement for reasonable operating speed is considerably higher than for deep draft ships. (The 1171 Class LST uses some 14,000 shaft horsepower to achieve 15 knots sustained speed.) For defense against submarines, this speed is considerably below the optimum and for long haul ocean transport such ships must be considered uneconomical. For this reason it is envisaged that beaching-type ships would be used primarily in the support of land and air forces from such off-shore or back-up area bases as would be found in large theaters of war. In all potential theaters the sea distances between these bases and the forward areas seldom exceed 1500 nautical miles. Over such relatively short sea distances, a beaching-type ship delivers considerably more cargo than conventional cargo ships. This is true even if the latter's discharge operations are not disrupted by frequent shifts of anchorage or by weather and water conditions. The simplified discharge system of a beaching ship also reduces terminal manpower requirements drastically (potentially by 80 percent) and eliminates the need for lifting the many lighters needed for conventional "over the beach" discharge operations (approximately 24 per conventional ship on discharge berth).

3. Beaching Ships in General War. The utility of beaching-type ships in the period after a general nuclear exchange need hardly be emphasized. Almost without exception, port cities encompass or lie near major industrial complexes and are, therefore, prime targets for mass destruction weapons. A beaching-type ship is well suited for most of the vital missions which ships can perform in the post strike period, such as rescue and transfer of survivors and the carriage of rehabilitation supplies and equipment. After reduction of the submarine menace, beaching ships could also play a vital role in supporting surviving overseas forces where ports may have been destroyed.

4. Beaching Ships in Political-Economic and Limited War. In political-economic war, beaching-type ships appear to have little utility. In limited wars, beaching-type ships could play an important role. Supply support for forces sent to the scene of a limited war will, undoubtedly, come in part from stocks established at overseas bases. The sea distances between present overseas bases and potential limited war areas are sufficiently short to make beaching-type ships militarily attractive. In addition, the value of beaching-type ships for operations such as the Inchon invasion during the Korean conflict cannot be overemphasized.

E. COMMERCIAL USE OF SPECIAL MILITARY SHIPS

1. Roll-on, Roll-off Ships. The question whether industry could or should use roll-on, roll-off ships has received considerable attention in recent years. In general, industry has veered away from the idea in favor of container ships, which better utilize shipping space. There are indications that on certain trade routes a requirement for commercial roll-on, roll-off ships may exist or develop, but there is no indication that the characteristics of this traffic resemble military vehicle movements. While the military services require roll-on, roll-off characteristics in ships for the carriage of large numbers of self-propelled vehicles of greatly varying sizes and weights, commercial operators envisage primarily the carriage of trailers. The high ratio of gross cubic capacity to net cargo capacity on trailer ships renders them economically feasible only for high volume, short run, traffic such as is found in the coastwise trade. It is not surprising, therefore, that the inauguration of the Pan Atlantic lift-on container ship service on the Gulf-East Coast routes marked the end of most commercial interest in roll-on, roll-off ships in this country, except for short run operations. It is clear that for the time being U. S. overseas operators are not interested in roll-on, roll-off ships except possibly under long term Government charter.

2. Beaching-Type Ships. Commercial use of beaching-type ships is rare. On the north coast of Ireland and along certain sections of the west coast of Africa beaching-type ships are being used to handle traffic in areas where it is uneconomical to provide port facilities. There is no immediately apparent reason for a commercial operator to use such ships except in restricted circumstances.

F. MILITARY USE OF SPECIAL COMMERCIAL SHIPS

1. General. One of the more significant recent innovations in commercial shipping is the growing trend toward the use of container ships. It is pertinent then to consider the extent to which container ships can be utilized to satisfy military wartime requirements. There are two aspects to the military requirement; one involves moving military wheeled and tracked vehicles, the other involves moving military palletized or containerized general cargo.

2. Container Ships as Vehicle Carriers. One method of adapting container ships to the carriage of military vehicles would be to provide removable platforms or 'tween decks, since the holds of container ships are normally open from the tank top to the weather deck. This is technically feasible and any additional cost could qualify as a defense feature allowance. Facilities could be provided to permit carrying the vehicles in a road-ready condition.

Commercial-type container ships can probably be designed to be readily adaptable to roll-on, roll-off loading of a significant portion of their capacity in order to carry wheeled vehicles. The extent to which this might be supported as a defense feature would depend upon the degree of increased utility, cost, and degradation of commercial capacity.

There is a clear need for commercial operators and designers to study military considerations at the earliest possible time, so that mutually agreeable military features can be incorporated in container ship design from the outset.

3. Military General Cargo and Container Ships. The military departments have pioneered the large scale use of shipping containers. The Army alone now owns over 50,000 such units. Their size is relatively small, roughly a seven-foot cube. Military

land transport equipment and containers are affected by all the limitations of land transportation nets, especially those abroad. This has kept down the size of military containers to well below those used in industry. It may be possible to use commercial-type containers and container ships in point-to-point service for military purposes if industry sees its way clear to standardize container ships. However, it is more likely that commercial container ships will gain military utility only if certain modifications are made. Specifically, it would be possible to transport present day military containers and other dry cargo with reasonable efficiency on a container ship if platforms of the same size as the container cells were designed to be locked into the vertical supports at appropriate levels.

G. CONCLUSIONS

1. There are two basic qualitative deficiencies in the nation's inventory of cargo ships for the support of wartime military operations. One deficiency is a fleet of roll-on, roll-off ships capable of rapidly delivering the large tonnages of military vehicle cargo, generated in wartime, especially in the initial deployment of troops in active or threatened limited wars. Another is a fleet of beaching-type ships capable of delivering significant quantities of cargo directly to the shore under conditions where ports are not available.

2. There is little commercial interest in roll-on, roll-off operations. If the volume of commercial vehicle traffic should grow sufficiently to induce industry to enter the roll-on, roll-off field, ships developed for this purpose should be of military utility in wartime.

3. There is no readily identifiable commercial requirement for beaching-type ships and vessels of this type should be considered and developed purely for military purposes.

4. The trend in industry is toward container ships. Such ships are not, however, fully compatible with military shipping requirements at this time.

5. There is a probability that, if action is initiated in the design stage, commercial container ships may be made readily adaptable to the carriage of military cargo including military containers and vehicles.

H. RECOMMENDATIONS

1. The military services and the Maritime Administration should continue investigations of possible alternate sources for providing special-purpose ships.

2. The Maritime Administration should, in cooperation with industry and the military services, investigate the possibility of building into container ships a capability of carrying military cargo such as smaller unitized loads and vehicles.

3. If these investigations are unfruitful, the roll-on, roll-off and beaching-type vessels should be considered as purely military craft, and developed and procured under military auspices rather than by the Maritime Administration.

4. It is desirable that the military services survey their own procedures to identify changes which would permit more effective military use of commercially competitive ship types.

SPECIAL SUPPORTING STUDY NO. 6

THE ROLE OF THE U. S. MERCHANT MARINE IN GENERAL WAR

A. INTRODUCTION AND ASSUMPTIONS

The following discussion is based primarily on assumptions of a general war situation where there is little or no warning and therefore little or no mobilization in the ordinary sense. This presupposes a brief period (not more than several weeks) of nuclear exchanges involving extensive nuclear damage to the homelands of the participants, including extensive damage to (or effective nullification of) the strategic strike/retaliatory forces. It is not necessarily assumed here that the outcome of the massive nuclear exchange will determine the outcome of the conflict; therefore, the following discussion introduces post-attack military action as a possible contingency. Finally, during the short period of massive nuclear exchange, the U. S. merchant marine will be engaged only in seeking sanctuary or otherwise trying to survive.

B. DAMAGE PREDICTIONS

Under the foregoing assumptions as to the terms of the war, the damage considerations most relevant to merchant shipping requirements are:

1. Damage to U. S. population and property, U. S. -controlled merchant ships, and U. S. shipping support facilities including manpower, fuel, ports, and shipyards.

2. Damage to resources of present or potential allies, in the same categories listed in 1.

Damage to allied resources must be taken into account because of the agreements for the pooling of merchant shipping, and because continued allied capability may be a vital factor in recovery.

There are several important aspects to the pattern of damage that might occur to the United States and allied resources listed above, such as:

(a) Differential Damage Patterns: U. S. vs. Allies. The attack may result in widely differing degrees of damage among the United States and its allies. United States losses might be very heavy, while allied losses might be relatively light--particularly for individual countries that offer limited retaliatory capability against the Sino-Soviet Bloc.

(b) Differential Damage Patterns: Population vs. Other Resources. The losses in population may be of different proportion than damage to physical resources, including shipping. Because the function of physical resources is to serve population, it may be said that population losses will be the ultimate determinant of shipping requirements. If population losses are extremely heavy, shipping requirements will probably be relatively light; and if population losses are relatively light, then shipping requirements for normal and rehabilitation needs will be very great, and sizeable shipping deficiencies will surely exist.

(c) Differential Damage Patterns: Ships vs. Shipping Support Facilities. Losses of ships will be different from losses of shipping facilities such as ports, shipyards, fuel, and specialized shipping personnel. In the event of a nuclear war, all merchant shipping will clear the high seas and attempt to evacuate major ports. The time of resumption of large scale movements of ocean shipping, following the nuclear exchange, will depend on a number of factors, including the degree of reduction or containment of the enemy submarine threat.

In the event of surprise all-out nuclear attack, the shipping assets that comprise the reserve fleet would be effectively eliminated, as destruction of shipyard facilities would prevent activating such reserve fleet ships as may survive. Therefore, only active shipping which survives initial nuclear and/or submarine attacks would be available for post-attack use.

It is predicted that shipping caught in major port areas would be largely destroyed but that most of the shipping in minor ports and anchorages would escape nuclear attack. Bearing in mind for example, that on an average day there are about 4000 ships at sea in the Atlantic Ocean area, it is estimated that 90 percent of the shipping at sea will escape initial nuclear and/or submarine attacks. Depending on the amount of warning received, if any, it is broadly estimated that from 50 to 75 percent of active merchant shipping will escape damage.

Since at least 50 percent of the U. S. -controlled merchant marine is expected to escape damage, relatively more of it is likely to survive than other resources, and it would appear unlikely that ships would be the limiting or critical factor in the post-war period. However, many major port areas may be destroyed and most of the larger port areas are likely to be contaminated by fallout.

If the foregoing differentials in possible damage patterns are considered, it is apparent that when availabilities are matched against post-war shipping requirements, there may be no deficiency or there may, on the other hand, be a serious shortage. For that reason it is not feasible to offer quantitative measures of requirements for ships in the post-war period. Therefore, the following discussion offers qualitative measures of requirements, most of which are expressed in terms of post-war shipping problems that are likely to arise.

C. POST-WAR REQUIREMENTS, USES AND PROBLEMS

1. Non-Military Uses and Requirements. The principal problems will be to control and direct the surviving merchant marine in support of the nation's survival and recovery efforts. Firm management arrangements for redirecting the surviving fleet to meet high priority needs should be developed. These may include:

(a) Early logistic support of areas isolated by blast destruction and fallout.

(b) Transportation of survival items between other areas of the country until other forms of transportation can be re-established.

(c) Mass transfers of survivors from especially hard-hit and difficult-to-supply areas.

(d) Import of items necessary for the recovery of an unbalanced economic system.

(e) Possible use of merchant ships as sources of emergency power, improvised hospitals and temporary housing.

2. Military Requirements. Assuming that the surviving merchant ships have sought sanctuary in friendly ports or anchorages remote from the conflict, there will remain some capability for the fleet to:

(a) Aid in the reconstitution of the residual military forces remaining.

(b) Assist in the rehabilitation of the economy.

Since industrial facilities will probably have suffered extensive damage, it appears that there will be little residual manufacturing capability and no early need for movement of strategic manufacturing materials. Rather, the country must have fuels, foodstuffs, and other necessities which will enable it to operate the ships, aircraft, motor vehicles, and related facilities needed for the reconstruction of its forces and the beginnings of a new economy.

Considering damage to land lines of communication and transport, the merchant marine's military usefulness, for at least the first six to nine months following the outbreak of war, will be largely confined to assisting in the reconstitution of military potential and in the rehabilitation of facilities in general along the sea coasts. As land lines are repaired and placed in use, their contribution to the over-all task will increase, as will continued demands on the merchant marine for overseas movement.

It is possible that requirements for reconstitution of military forces and those for rehabilitating the economy will be in direct competition, at least in the early post-war period. The post-attack situation may require that the Government give priority to force-reconstitution to ensure a capability to exploit whatever advantage of position it may have, or to overcome any disadvantages it may face. In such an event, maritime support of the civilian economy would be initially limited to that remaining over and above the requirements for reconstitution and deployment of military forces. On the other hand, the post-attack situation may demand that partial economic rehabilitation be prerequisite to reconstituting a military potential.

D. CONCLUSIONS

1. Merchant ships will not be the critically short item in the post-attack period. The merchant marine is most likely to be the least damaged transportation medium.

2. In view of the potentially broad range of damage which might arise from general war, it is impractical to forecast shipping requirements and deficiencies in detail. However, if optimum capabilities for waging political-economic war and supporting limited war are achieved, it is reasonable to expect that initial general war requirements for civil rehabilitation and reconstitution of our military position can be satisfied with residual shipping in the post-attack period.

3. A major problem with respect to post-attack use of shipping will be to establish methods and priorities for its use.

SPECIAL SUPPORTING STUDY NO. 7

MILITARY THREAT TO U. S. MERCHANT SHIPPING; COUNTERMEASURES

A. INTRODUCTION

This supporting study has not ventured into the general problem of sea warfare. First of all there has been neither the time nor the manpower available for such a study, nor has the group been gathered for this particular purpose. Nevertheless, it is obvious that enemy submarine, aircraft, and mine warfare threats would have an important bearing on the use of the merchant marine in a major war. The probable effects of such threats on the future development of the U. S. merchant marine, and the probable impact on merchant shipping capabilities in wartime, are of great importance and must be considered.

A detailed analysis of the military threat and countermeasures problem was not undertaken in this study. Rather an attempt was made to estimate the proper interaction between the maritime service (used broadly to indicate all merchant vessel service in support of the general objectives of the United States) and the military forces which have the responsibility of fighting the war at sea, and in particular the undersea war, including mine warfare. This paper also suggests some of the lines along which further inquiry should proceed.

B. THE THREAT

The absolute wartime threat to the U. S. merchant marine is at the option of the enemy and can be evaluated only by reference to the type of war envisioned, the enemy total capability and the portion of the total capability which the enemy is willing to commit to the action.

1. General War. In an all-out general war involving nuclear exchange on the homelands of the major world powers, the immediate attack on merchant shipping assumes a secondary role (see Special Supporting Study No. 6). Anti-shipping submarines may be deployed before hostilities in order to protect them from retaliatory attack as well as to accomplish what attrition they can before the high seas are cleared of shipping. Loss of shipping in major ports subjected to nuclear attack and on the high seas during this initial phase of the attack will probably be in the range from 25 to 50 percent.

After the nuclear exchange in a general war it can be assumed that the enemy submarine fleet has been subjected to an "attack at source." The port and servicing facilities of the fleet may no longer be available to them. This tends to limit the number of submarines which they can reasonably be expected to maintain at sea in an effective operating role during the subsequent phases of the war. Even should the enemy submarine fleet be largely at sea during the exchange they could remain at sea only a short time, for most estimates indicate a predominance of conventionally powered submarines. Even those submarines which would have a capability to remain at sea for long periods are limited by the number of weapons carried. Once these are

expended, the submarine, of course, can no longer attack and must be rearmed and refitted. Thus under general war conditions, the availability of shipping will undoubtedly be greatly reduced; the requirement for shipping may be less and the threat to shipping from submarine attack, while initially large and capable of effecting a high immediate attrition, will reduce rapidly because of the expenditure of the available weapons at sea and the probable difficulty in resupplying and rearming the submarines.

2. Limited War. In Project WALRUS, the assumption was made that a major attempt at interdiction of sea lanes during a limited war would be met by a major change in the character of the war. Consequently, for purposes of this supporting study no precise definition of limited war is considered necessary. A further assumption was made that limited war would not pose a significant threat to sea lines of communications--except possibly in a relatively small combat area. Such a threat would be primarily in the form of aircraft and mines (and possibly submarines) furnished by the U. S. S. R. to other nations.

C. CONSIDERATION OF THE SUBMARINE ANTI-SHIPPING WAR

Based upon previous studies of wartime protection of merchant ships at sea, it is assumed that the use of large convoys, accompanied by sufficient naval escort vessels, is the preferred mode of operation in that it can reduce the attrition rate to acceptable levels even against severe submarine threats. Of course, such a convoy becomes a more profitable target for air or missile attack as its size increases.

The object of having ships sail in convoys is: (a) to reduce the number of discrete targets presented to the enemy, although convoys can usually be detected at greater distances than single ships, and (b) to make it dangerous to attack the convoy because of the presence of armed escort vessels. The second is undoubtedly the more important factor. Its value is proportional to the number of escort vessels and the effectiveness of their armament. Speed of the convoy is relatively unimportant as long as the chief protection is from the efforts of the escorts. There is an advantage, however, in having convoy speeds which exceed the maximum surface speed of the enemy's conventional submarines since this would materially assist the escorts in their protective task. Furthermore, since the number of ships required to transport goods at a given rate is an inverse function of speed, ship speed should be as high as possible consistent with the requirements of the escort vessels themselves. It appears that the detection efficiency of the latter begins to fall off at speeds of about 20 knots, so it is suggested that this figure should be the ceiling--until sonar that is effective at higher speeds is developed.

For a given spacing of escorts on the periphery of a convoy, their number increases in proportion to the diameter, whereas the number of ships contained therein varies as the square of the diameter. With a limited number of escorts the degree of protection is increased by making the convoys as large as possible, because the escorts can be more closely spaced. For the same total number of escorts, the use of 200-ship instead of 50-ship convoys permits halving the spacing between escorts. Moreover, it protects more shipping with highly effective escorts, such as aircraft carriers.

Increasing a ship's speed will materially better its chances of evading submarines. This is particularly true if the ship is equipped with detection gear that enables it to know that it is being approached by a submarine before the latter has reached torpedo range; in such a case, it will be able to escape if it has even a moderate speed advantage. The gear must be sensitive beyond torpedo range (say 10 miles) when the ship is cruising at normal speed. Special Supporting Study No. 2 considers the practicality of high speed merchant ships and discusses their economic feasibility.

Mounting detection gear on merchantmen would assist the Navy in its detection of submarines at sea. This problem, detection of submarines and ocean surveillance, continues to be the most serious and difficult aspect of the submarine threat.

Because of the high noise levels inherent in surface vessels, passive sonar listening devices cannot be readily employed on merchantmen. It is conceivable that research and development could produce a more effective surface ship passive sonar by reduction in self-noise, or isolation of equipment in a towed pod. However, it is probable that future submarine targets will become increasingly quiet and harder to detect even by improved techniques.

In the field of self-protection of merchantmen, it should be noted that the anticipated widespread use of the helicopter, both manned and radio-controlled, implies the need for carrying considerable numbers of these vehicles at sea. Merchantmen could be employed for this purpose. In cases of independent sailings, helicopters might be manned by naval detachments for submarine search and destruction missions and could also provide evasive capabilities to the ship. In convoys, merchantmen could provide the operating platforms and servicing areas for these vehicles manned and controlled by the naval escort forces.

Attacking submarines frequently employ the techniques of hiding beneath a convoy. In this position they are relatively undetectable by sonar due to the noise and interference of the ship traffic, and their pursuit and attack is increasingly complicated. Simply launched homing torpedoes are available today and could be effectively employed by merchant ships to seek out and destroy submarines found beneath the convoy.

D. CONSIDERATION OF THE AIR THREAT TO MERCHANT SHIPPING

It is difficult to assess the air threat against merchant shipping in time of limited war since it is so dependent upon the intent of the enemy. In an all-out thermonuclear exchange the air threat against merchant shipping is much less important that the overall air threat. But it is not inconceivable that in limited wars friendly ports may be subjected to air attack without all-out war taking place. This air attack could well take two forms (a) bomb damage to shipping and port facilities, and (b) the interdiction of the port by mining. In the free world there are few ports which could defend themselves against either form of air attack.

E. CONSIDERATION OF THE MINE THREAT TO SURFACE SHIPPING

The U. S. S. R. is known to have a vast stockpile of mines as well as elaborate facilities capable of rapid mass production. They are also known from previous history to regard mine warfare as a military operation worthy of the effort required. It is only logical, therefore, that any future conflict involving sea interdiction campaigns will be characterized in part by mine warfare. Furthermore, since mines are passive means of defense, they are, perhaps, the most likely threat in limited war situations.

Use of mines can obviously lead to heavy ship casualties but the effect on shipping operations is perhaps best illustrated, by citing a historical example. During the Wonsan landing in Korea, troop and troop-support ships of the United Nations were delayed five days while all available minesweepers were employed to clear a channel for their approach. Thus, it can be seen that it is not necessary that port areas be subjected to nuclear weapon attack in order to render them unusable by merchant ships. This, in turn, emphasizes the prudence of being prepared to operate through minor ports or "over the beach" even in limited wars and implies a requirement for proper and adequate lighter craft and some beaching-type vessels.

F. CONCLUSIONS

1. Unescorted single merchant ships at speeds of 20 knots and below are highly vulnerable to enemy submarine action unless the submarine fleet is under frequent attack.

2. Even when proceeding in convoy, it is most desirable that the speed of merchant ships be as high as possible, consistent with efficient detection capabilities of the escorts--about 20 knots now. Upon development of improved sonar, higher convoy speeds will be practicable and desirable.

3. The U. S. S. R. has the capability of effectively blocking, or at least reducing, the use of major ports of entry by mines sown either by aircraft or submarines.

4. Aerial bombardment of ships on the high seas is considered less dangerous than the use of aircraft for mining or for bombing port facilities, no matter what type of explosive may be used.

5. While it was impracticable for Project WALRUS to include a comprehensive comparison of U. S. requirements and capabilities in the areas of anti-submarine warfare and anti-mine warfare, these are, nevertheless, matters of vital importance.

G. RECOMMENDATIONS

1. Since even with the best planning a sudden outbreak of war will necessitate the use of some unescorted merchant vessels, such ships should be the fastest available and should be given some detection equipment to aid in avoiding submarines.

2. Perhaps the quickest answer to the mine problem is the ability of long haul cargo carriers to unload over beaches and in minor ports. For this problem, lighters should be made available. The feasibility of giving certain ships the ability to carry their own lighters or pre-loaded barges should be investigated.

3. Some ships should be designed for rapid unloading in secondary ports and on beaches. The ability for rapid unloading and rapid transit of the danger zones will aid in reducing vulnerability.

SPECIAL SUPPORTING STUDY NO. 8

CURRENT STATUS AND TRENDS OF U. S. MERCHANT MARINE

A. NATIONAL POLICY

The Merchant Marine Act of 1936, as amended, declares it to be national policy that the United States shall have a merchant fleet (a) sufficient to carry a substantial portion of our waterborne foreign trade; (b) capable of serving as a military and naval auxiliary for national defense; (c) owned and operated under the U. S. flag as far as practicable; and (d) composed of modern, well-equipped ships, constructed in the United States, and manned by trained and competent personnel.

B. ECONOMIC PARTICIPATION

In considering the economic participation of the U. S. merchant marine, the reference "a substantial portion of our foreign trade" has come to mean 50 percent. Yet, despite the assistance programs in effect since 1936, the U. S. merchant fleet has carried a steadily diminishing proportion of U. S. foreign trade, dropping from 18 percent in 1957 to 12 percent in 1958. In 1957, U. S. merchant ships carried 19 percent of our dry cargo trade but only 15-1/2 percent of our tanker trade. Passenger ships assisted by Government subsidy made the best record with 39 percent participation. These figures do not include any foreign flag ships under effective U. S. control. By statute all of our domestic trade is reserved to ships flying the U. S. flag.

C. COMPOSITION OF THE U. S. MERCHANT FLEET

As of July 1, 1959, there were 1013 ships (including 81 inactive) in the privately owned U. S. flag merchant fleet. Of these, 313 were subsidized.

Except for the LIBERTY ships most of the cargo vessels are in the speed range of 14-16 knots. The greatest number of these are in the 10,000 deadweight ton (DWT) class, although there is a sizable group of T-2 tankers around 16,000 DWT. The vast majority of these ships were built in the war years 1943-45. Combination and passenger ships present a more even age distribution.

Of the 1,711 merchant ships in the reserve fleet*, the largest group is composed of LIBERTY ships. These are, however, being scrapped at a rate of approximately 100 per year. As of July 1, 1959, 129 had been sold for scrap. As a result of decisions arrived at through the Maritime Administration-Navy Planning Group no mobilization need is seen for an additional 1000 LIBERTY ships and they will gradually be disposed of over the next ten years. Preservation of these ships has ceased except for cathodic protection of underwater hulls.

There are 518 ships considered to be under effective U. S. control, though under friendly foreign flags. Of these, 295 are tankers, 135 are freighters, 81 are dry bulk carriers, and 7 are combination passenger-cargo vessels. Over 200 of these ships, mostly medium and large tankers, were built since World War II.

D. SHIPBUILDING AND REPAIR FACILITIES

Commercial shipyards capable of building ships of the SCHUYLER OTIS BLAND size, 477 feet in length and 66 feet in breadth, are the smallest considered in U. S. merchant marine mobilization planning. In the 26 such shipyards considered, there are 127 suitable shipbuilding ways. Seventy-eight of these ways have been allocated to the Navy and 49 to the Maritime Administration for mobilization purposes. The Maritime Administration also has four Government-owned reserve shipyards which have a total capacity of 21 shipbuilding ways, about half of which are nonexistent at this time.

On the ship repair side, there are currently available a total of 304 drydocks, 115 of which are capable of handling ships in excess of 477 feet in length and 66 feet in breadth. Of the latter, 37 are U. S. Navy-owned docks.

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*In addition approximately 250 ex-military auxiliaries are presently maintained by the Maritime Administration in the reserve fleet.

E. MANPOWER

As of July 1, 1959, merchant marine personnel employed aboard active ocean-going U. S. flag vessels of 1000 gross tons or over totaled approximately 51,000 (12,000 licensed and 39,000 unlicensed). These figures exclude approximately 6500 officers and seamen employed under Civil Service aboard Military Sea Transportation Service ships and a seasonal peak of approximately 14,000 merchant seamen employed on the Great Lakes.

These figures represent actual jobs in the current active U. S. merchant fleet. U. S. Coast Guard records contain the names of approximately 250,000 men holding seamen's papers of one kind or another. These are considered active seagoing men, and so it appears there are sufficient active seamen and officers available to man a merchant fleet at least twice the size of the current active fleet.

The problem of obtaining deferment of merchant seamen from a selective service military draft in the event of a major conflict has been worked on but remains unresolved. While the Office of Civil and Defense Mobilization generally supports this proposal, the Selective Service is reluctant to make any exception to a rather firm policy of not exempting any occupational group.

In the other major manpower requirement areas of the U. S. marine industry, longshore employment approximates 72,000 men, nearly two-thirds of whom are in Atlantic Coast ports. Commercial shipbuilding and ship repair yards currently employ in excess of 54,000 workers, while U. S. Naval shipyards employ in the neighborhood of 75,000 men.

F. SUBSIDY PROGRAM

The Merchant Marine Act of 1936 authorized two types of subsidies by which the Government can help to maintain a strong privately owned merchant fleet and a strong shipbuilding and repair industry.

The first of these is an operating-differential subsidy payable only to qualified operators engaged in foreign trade liner service on designated essential trade routes. This subsidy represents the difference between actual U. S. voyage costs in certain categories (wages, insurance, subsistence, and maintenance and repair) and comparable costs of foreign competitors.

There is, however, provision for recapture by the Government of one-half of profits exceeding 10 percent. Subsidy costs after recapture for the current fiscal year are estimated at $160,000,000 covering about 313 ships. With increased voyages for current operators, contracts with new operators, and additional Great Lakes services, it is estimated that operating subsidy costs after recapture will reach $197,000,000 for fiscal year 1963, covering 450 ships.

The second form of subsidy applies to ship construction. Only ships to be operated in foreign trades are eligible for construction differential subsidy, and the effect again is to equalize foreign and domestic ship-building costs. Thus the U. S. operator is placed on an equal cost basis with the foreign operator who builds his ships at lower cost in foreign yards.

G. SUBSIDIZED FLEET REPLACEMENT

The subsidized ships are the hard core of the replacement programs since an operator who wants to renew his subsidy contract must agree to replace his ships before they become overage. The law precludes operating subsidy for a vessel over 20 years of age, special circumstances excepted.

Negotiations with most subsidized operators have produced commitments for replacing 282 of the subsidized ships extending into the early 1970's. In these agreements replacement ships have been scheduled so that the 20-year age peak around 1964-1965 is nearly eliminated. The estimated cost of these 282 ships will exceed four billion dollars, with about 50 percent to be assumed by the United States as construction subsidy.

In the current fiscal year, funds for the construction subsidy of 16 ships are expected to be available. The Maritime Administration is programming for 34 new ships in 1961, 34 in 1962, and 35 in 1963. On July 1 of this year, 72 merchant ships were under construction or conversion (both subsidized and unsubsidized) in U. S. yards. These contracts aggregated 770 million dollars.

H. PASSENGER SHIPS

Numerically there exists a small deficit in passenger transport capacity to meet military requirements, according to Maritime Administration-Navy Planning Group studies. However, there are serious qualitative deficiencies, particularly as to speed. Only 16 of the 159 ships in this category are capable of speeds of 20 knots or more. Nearly all of these were built during World War II, and will be 20 years old within the next few years.

Vulnerability to submarine attack is significantly reduced at speeds of 25 knots and above, according to the Department of Defense. However, there are today only three U. S. commercial passenger ships capable of these speeds, the CONSTITUTION, INDEPENDENCE, and UNITED STATES. Construction of two new fast superliners was authorized by the Eighty-fifth Congress but funds have not yet been appropriated.

I. TANKERS

On July 1, 1959, the privately owned U. S. flag tanker fleet consisted of 336 ships, 275 of which were active. Approximately 70 percent were war-built vessels rapidly approaching obsolescence. The problem of the quality of our tanker fleet is compounded by the present depressed state of the tanker market.

Tankers on order world-wide are at a record breaking post-war high of 775 vessels, aggregating 26.6 million deadweight tons. There is a tremendous world-wide tanker surplus which is expected to extend beyond 1963. Eight million deadweight tons are laid up throughout the world.

During such periods of surplus tonnage, the high capital and operating costs of U. S. flag tankers render them virtually noncompetitive with foreign flag tankers. There is, therefore, little economic justification for an independent tanker owner to build U. S. flag tankers at this time.

A recent report of the Maritime Administration-Navy Planning Group indicates a decided deficiency in U. S. tanker tonnage for mobilization purposes. The report

states, however, that currently scheduled construction will overcome this shortage by July 1962.

J. COASTWISE AND INTERCOASTAL TRADES

The Government took over all vessels in the coastwise-intercoastal trade during World War II and inland carriers, principally railroads, absorbed their traffic. After the war domestic operations were gradually restored with war-built ships. In the bulk trades, especially petroleum, these ships have generally proven competitive. On the other hand, rising labor costs have prevented dry cargo ships from recovering the pre-war coastwise trade. Since 1939 the deadweight tonnage in the domestic dry cargo ship fleet has declined nearly 60 percent, while tanker tonnage has increased by 35 percent. The pre-war passenger ship has practically vanished from the coastwise and intercoastal trades although two remain in service to Hawaii.

Traffic figures indicate that the decline in dry cargo tonnage has occurred primarily in break-bulk trades, where rising costs, particularly in cargo handling, have largely eliminated economic advantages of ocean transport. More than half of every dollar of freight revenue received must be spent for loading and unloading ships.

An important exception is to be found in ships designed for loaded freight cars, loaded trailer vans, or packaged lumber. These have effectively met the problem of cargo handling costs. The efficiency of the big-package carriers suggests that technological improvement may provide solution of the problem of cargo costs in handling break-bulk dry cargo.

The other primary difficulty in this trade is freight rates. The complaint of the coastwise ship operators is that inland carriers, principally railroads, are permitted to engage in discriminatory rate cutting in competition with water carriers, absorbing the rate reductions by higher rates where there is no water competition.

The reestablishment and preservation of this segment of the U. S. merchant marine could prove a vital national asset by increasing the national shipping capability, and by contributing to the economic growth of the United States and a balanced transportation system.

K. TRAMPS AND BULK CARRIERS

The tramp ship has no fixed itinerary. It picks up cargo where it is to be found for each voyage, usually for a single shipper carrying a bulk commodity.

The high U. S. standard of living that affects labor, subsistence and repair costs is the reason the U. S. tramp operator cannot compete. The cost of a U. S. crew alone exceeds the charter hire of a fully manned and provisioned foreign flag tramp in today's market.

When war was declared in September 1939, the British, Norwegian and Dutch vessels which had been serving U. S. bulk foreign trade were withdrawn and the German, Italian and Danish fleets were blockaded. By 1941 the volume of foreign flag tonnage entering U. S. ports had dropped to 17 million net tons compared to nearly 33 million in 1939. This reliance on foreign flag shipping and its diversion had serious consequences on domestic industrial defense programs.

On July 1, 1959, the tramp segment of the U. S. fleet consisted of only 88 active ships. Here, again, is the case of an important U. S. industry unable to survive against foreign competition without aid. Although a certain amount of support of tramp operations has been provided by the 50-50 cargo preference law, a satisfactory basis for Government subsidy of tramp ship operations has never been developed.

L. "FLAG OF CONVENIENCE" SHIPS

Considerable controversy exists with respect to the registration of U. S.-owned ships under the so-called "flags of convenience." This situation is one of simple economics.

The payment of operating-differential subsidies is limited by law to liner operations on essential trade routes. There is no similar aid available to tankers and dry bulk carriers in purely commercial foreign trade. Accordingly, U. S. importers of bulk materials find it uneconomical to use U. S. flag ships because of high operating costs. To assure control of their transportation requirements, many U. S. importers of bulk commodities have seen fit to own foreign flag ships. See Special Supporting Study No. 9 for further discussion of this matter.

M. RECENT DEVELOPMENTS

Four types of LIBERTY ship conversions have been accomplished, each resulting in an increase in speed from 10 knots to 15 knots or better. One conversion retained the old bow but incorporated a steam turbine installation. The others had new bows. In one, a diesel plant was substituted for the original steam reciprocating machinery; in the others, a free piston gas turbine and an open cycle gas turbine were installed. It is significant that LIBERTY ships in the reserve fleet can be upgraded if time and facilities permit. However, 1000 LIBERTY ships are earmarked for scrapping.

In July 1959 the world's first nuclear powered merchant ship, the NS SAVANNAH, was launched. While not itself economically competitive, it may show what is necessary to make nuclear propulsion commercially sound. Research has shown that a cheaper, more effective nuclear plant can be developed. The Maritime Administration is prepared to apply these advances to a prototype tanker, utilizing a boiling water reactor, when funds are appropriated. A government-industry cooperative program is being considered with the government responsible for the excess in construction cost of a nuclear ship over a conventional ship. A joint Atomic Energy Commission-Maritime Administration program is developing a gas cooled reactor propulsion system.

When the nuclear powered merchant ship SAVANNAH is placed in service the United States will possess a most valuable instrument of good will for use in the political-economic conflict. The prestige potentialities of this ship should be widely exploited in support of U. S. foreign policy objectives.

SPECIAL SUPPORTING STUDY NO. 9

"FLAGS OF CONVENIENCE"

A. BACKGROUND

The term "flags of convenience" applies essentially to the registry of merchant shipping under the flags of Panama, Liberia, and Honduras (PANLIBHON).

Limited United States use of selected foreign registries, including Panamanian and Honduran, was initiated prior to World War II by large corporations with whom the operation of shipping was a secondary function. The major steel corporations and large oil companies became increasingly dependent on foreign sources of raw materials. To assure the steady flow of ore and oil, they needed to expand sea transportation resources under U. S. ownership and control.

Following the outbreak of World War II, and prior to its entry therein, the United States Government sanctioned the transfer of U. S. -owned merchant ships from the United States flag to Panamanian flag. This permitted our allies to receive increased aid at a time when our own Neutrality Act prohibited U. S. ships and crews from sailing into the war zone.

Upon the entry of the United States into the war, U. S. -owned merchant ships under Panamanian and Honduran flags were promptly assimilated into the war effort and so employed as to best further the objectives of the United States and its allies.

Following World War II, the overseas transportation of tremendous quantities of oil, ore, and other raw materials became a vast peacetime enterprise. This in turn occasioned the expansion of worldwide shipbuilding activities and the growth of large bulk carrier fleets. In the competitive expansion of world shipping greater use of selected foreign registry was made by shipowners of all nations. Liberian registry came into widespread use at this time.

As of July 1959, there were approximately 25, 000, 000 deadweight tons of merchant shipping registered under PANLIBHON flags. U. S. citizens owned and controlled about 10, 000, 000 deadweight tons of this total. It is important to note that tankers, which are so vital to the success of any war effort, represented about 7, 000, 000 deadweight tons of the U. S.-owned portion of this shipping.

We must regard the U. S. -owned PANLIBHON flag fleet as a significant operating reserve for mobilization purposes. These merchantmen will be required immediately in the event of war to augment the limited U. S. flag sealift capability. They are available for this purpose and are, in effect, under U. S. control. (See Section E, below.)

B. ATTACKS ON "FLAGS OF CONVENIENCE"

The registry of U. S. -owned ships under "flags of convenience" has long been criticized by foreign shipping interests and certain European governments. Further,

such practice has been bitterly opposed by U. S. and international maritime labor organizations.

Despite international criticism of U. S. practices, many foreign shipowners have also registered ships under "flags of convenience". These include British, Danish, Greek, Italian, Norwegian and Swedish shipowners. British shipowners can also use Bermudan registry under British flag as a tool of convenience (lower taxation).

1. Western European Governments. In June 1959, at the request of the Netherlands Government, the "flags of convenience" problem was discussed between governmental representatives of the United States and nine European countries. The U. S. delegation made no commitments nor offered any encouragement in regard to European proposals for changing existing "flag of convenience" policies. However, the Europeans have not given up hope and it is expected that they will seek to resume inter-governmental discussions of this matter in the reasonably near future.

2. Maritime Labor Unions. The common objective of U. S. and international maritime labor organizations is to enforce bargaining agreements with the owners of all "flag of convenience" ships. This would enable them to exercise complete unionized control over the wages, welfare and working conditions of the crews that man these ships.

Until recently it has been the position of the International Transport Workers Federation (ITF) that individual "flag of convenience" shipowners should negotiate bargaining agreements with the maritime labor unions of the countries in which the crews were hired. However, this position was changed radically at the January 1959 conference of the ITF in London. At that time a decision was made by the ITF to require shipowners to hire crews under collective bargaining agreements concluded through affiliated unions of the country in which actual control of the shipping operation is vested. The above decision opened the way for U. S. maritime labor unions to intensify their campaign against "flags of convenience".

U. S. shipping interests are informed that labor's campaign will be launched without delay. They expect that concerted strikes will be made against selected shipping subsidiaries of major oil companies and selected operators of seagoing ore carriers. They expect that strikes by U. S. maritime labor unions will be backed by global boycott actions on the part of affiliated foreign unions.

C. U. S. SHIPOWNERS' POSITION

U. S. owners of tankers and bulk carriers refer to the flags of Panama, Liberia, and Honduras as "flags of necessity" rather than "flags of convenience". They state that they have been forced, by economic necessity, to register their ships under these flags and man them with foreign crews in order to compete in international trade with low-cost foreign shipping.

These owners contend that they cannot operate under U. S. wage scales without governmental subsidy. Rather than place their ships under U. S. flag without subsidy, these operators allege that denied "flags of convenience" their only practical reaction would be to sell their ships to foreign shipping interests.

Some owners are in an especially tenuous position due to "split operations"--a portion of their shipping is registered under U. S. flag and a portion under PANLIBHON flags. They fear that maritime labor unions will harrass their U. S. flag shipping in order to gain concessions in regard to their "flag of convenience" shipping.

D. LEGAL ASPECTS

In December 1958, at the time of the four-day world-wide boycott against "flags of convenience", several shipowners filed petitions in the Federal Courts of New York and Philadelphia requesting injunctions against the American maritime unions. The petitions alleged that the boycott had been instituted by the U. S. maritime unions in collaboration with certain foreign maritime unions and certain foreign shipowners. The petition for a temporary injunction was denied on the grounds that there was evidence of a "labor dispute" which, under the Norris-LaGuardia Act, precludes the use of injunctive relief. Further court action and the question of the jurisdiction of the National Labor Relations Board (NLRB) in this case was, at the time of this writing, still held in abeyance, pending the outcome of a NLRB hearing involving offshore operations (between Havana and New Orleans) of a Liberian flag vessel of the West India Fruit and Steamship Company.

E. EFFECTIVE U. S. CONTROL

For purposes of indisputable control, it would be preferable that all U. S.-owned merchant shipping be documented under U. S. flag. Such an ideal situation does not exist. At the same time, U. S. flag merchant tonnage is not adequate to meet our total wartime needs. This is particularly true with tankers, as about half of the U. S.-owned tanker tonnage is registered under foreign flags.

In the event of war it will be necessary to augment U. S. flag shipping. The Maritime Administration and the Navy Department have determined jointly that it will be practicable to bring a portion of the U. S.-owned foreign-flag shipping under direct U. S. control in the event of a national emergency. This effective U. S. control concept is a matter of expediency, rather than choice, and applies essentially to designated shipping under the "flags of convenience".

Determinations regarding effective control are not founded on governmental treaties. Assurances that specific ships will revert to U. S. control are given by the U. S. owners of the ships, not by the country of registry. Former U. S. flag vessels that were transferred to PANLIBHON registry are under effective control as a result of stipulations in the transfer contract approvals granted by the Maritime Administration. Less formal agreements apply to foreign-built shipping.

U. S. owners can register foreign-built shipping under any friendly flag of their choice, or transfer from one flag to another at will. In the case of foreign-built PANLIBHON-flag ships, the Maritime Administration normally negotiates agreements with the U. S. parent companies that the ships will be made available to the United States in the event of a national emergency.

Ships' crews must also be considered in making plans for implementation of effective control. The crews of ships under PANLIBHON flags are all nationals of countries friendly to the United States. The majority are nationals of NATO countries. On the outbreak of an emergency, ships would be routed to selected points for proper screening of personnel--and replacement where appropriate. Dependent upon individual ship locations on the outbreak of an emergency, it is possible that some of the foreign crews may defect and deliver a few PANLIBHON ships into enemy hands. In the event of a NATO war it is also possible that some European crews may ignore the orders of U. S. shipowners and deliver ships to ports of the countries from which they were employed. In the latter case, such ships would still support the common NATO effort and their employment would be governed by NATO pooling and allocation procedures.

1. Soundness of Effective Control under PANLIBHON Flags. The absence of operational control restrictions in the existing maritime laws of PANLIBHON governments permits the exercise of effective U. S. control without restraint. Additionally, the ocean shipping requirements of these small, friendly countries are limited and they would be unlikely to requisition ships for their own use in the event of war. Other factors that contribute to the soundness of our effective U. S. control concept are:

(a) The natural bond of U. S. ownership and allegiance is augmented by written agreements between the shipowners and the U. S. Government.

(b) The small PANLIBHON countries possess limited capabilities to both operate and maintain sizable merchant fleets. Ships under their flags usually ply the world's trade routes and have rare occasion to put into ports of their registries.

(c) PANLIBHON countries possess negligible capability to intercept, seize, or protect shipping on the high seas. Consequently, these nations are not in a position to expropriate U. S. property afloat or to dispute U. S. assumption of control over selected shipping.

(d) The United States possesses a definite and sizable capability to protect shipping at sea. Thus, the United States has both the power and the intent, in event of a national emergency, to consummate agreements with individual shipowners in respect to designated shipping registered under PANLIBHON flags.

(e) Further, during any national emergency declared by proclamation of the President, Section 902 of the Merchant Marine Act of 1936 empowers the Federal Maritime Board to requisition or purchase any vessel owned by citizens of the United States. U. S. rights under Section 902 are stipulated in all Maritime Administration approvals of transfer to PANLIBHON flags.

(f) It appears logical to assume that U. S. citizen-owned ships registered under PANLIBHON flags, for which effective U. S. control agreements exist, would, in the event of a national emergency, gravitate towards a United States protective umbrella for self-preservation. To refuse would probably lead to considerable difficulty in the procurement of war risk insurance.

(g) Additionally, the Ship Warrants Act, when enacted, will further increase the problems of possible non-conformist shipping. Under this Act, any vessel without a warrant would have no access to turnaround support services or repairs at any U. S. shore facilities.

2. Registry under NATO Flags (Other than United States). U. S. -owned ships are registered under nine NATO flags--Belgian, British, Canadian, Danish, Dutch, French, German, Italian and Norwegian. Such registries represent "flags of convenience" for practical and economical purposes. However, none of these ships is under effective U. S. control. No agreements exist for making this shipping available to the U. S. Government in the event of an emergency.

3. Implications of NATO Maritime Posture. With regard to exercising effective U. S. control, considerations applicable to PANLIBHON countries would not apply to the registry of shipping under the flags of other NATO nations for the following reasons:

(a) Most NATO countries are recognized as traditional maritime nations. They have the means and facilities to both operate and maintain a large number of merchant ships.

(b) Their maritime laws incorporate rigid restrictions with respect to ownership, manning and operational control of ships that fly their flags. They possess some degree of capability to protect or seize shipping on the high seas.

(c) NATO nations in general have committed their merchant shipping to a common pool in the event of a NATO war. (See Special Supporting Study No. 4 for further discussion.)

Without appropriate bilateral agreements to the contrary, approved NATO policy would preclude our taking control of such U. S.-owned ships as may be under NATO flags.

(d) It is of utmost significance in this connection that the United States must be prepared for emergencies other than a NATO war.

F. TRENDS

Already there is evidence that the maritime labor campaign is reducing the registry of ships under Liberian flag. Leading British ship brokers have reported that new Liberian flag tanker registrations lagged behind those of Britain, Norway, the United States, Japan, Greece, and the Netherlands during the first six months of 1959. This was attributed in part to transfers of ships originally destined for Liberian and Panamanian registry to British and Greek registry. Whether any ships owned by U. S. companies or affiliates were involved was not reported. Nevertheless, it is indicative of a trend.

U. S. owners of PANLIBHON shipping are becoming increasingly alarmed over the pressures exerted against "flags of convenience." A number of them have publicly announced that unless the United States Government, at highest levels, intervenes in this matter they will have no alternative but to transfer their fleets from PANLIBHON registries to registries under foreign traditional maritime flags, presumably those of Western Europe.

Of related interest is the fact that PANLIBHON governments keenly resent the disparaging remarks that have been made about their stature in maritime trade. Consequently, the "flags of convenience" controversy poses additional problems with respect to international good will.

G. CONCLUSIONS AND RECOMMENDATIONS

1. Should continued opposition on the part of foreign shipping interests, foreign governments and U. S. and international maritime labor organizations render the registry and operation of U. S.-owned ships under "flags of convenience" untenable, we would be faced with the problem of determining what steps to take to ensure the continued availability of these ships for national defense. It is probable that we would have to adopt one, or a combination of two alternatives:

(a) To allow the U. S.-owned "flag of convenience" fleet to migrate to the traditional maritime flags of Western Europe. This would be detrimental to the U. S. national defense posture, as we would have to depend upon uncontrolled foreign merchant shipping to meet a significant portion of our emergency sea transportation needs. It is unlikely that fully satisfactory intergovernmental agreements could be concluded to assure that this shipping would revert to U. S. control in the event of a national emergency.

(b) To expand governmental subsidy programs to support the operation under U. S. flag of all U. S. -owned and controlled merchant shipping that is engaged in competitive foreign trade. This would embrace "flag of convenience" shipping, the existing subsidized segment of the U. S. flag merchant fleet, the numerous U. S. flag ships whose applications for subsidy are pending, and probably others. Such course of action would prove to be a most costly undertaking and there is no likely prospect that the Government will adopt such a program.

2. Pending resolution of management-labor problems, the continued operations under "flags of convenience" of those U. S. -owned and controlled merchant ships that are presently so registered, represent a practical and at present the only economical means of sustaining an important segment of the U. S. -owned merchant marine. At present there is no satisfactory alternative.

3. Undisturbed operation of these ships under PANLIBHON registry seems to require the issuance of a court ruling that would prevent U. S. unions from boycotting and organizing PANLIBHON ships. The Government should bring to the attention of the courts its national security interests in maintaining effective control over these ships. If the court ruling is not favorable, the Government should seek by every possible means to show the extent of its interest in retention of the "flag of convenience" fleet and in preventing its transfer to the flags of other maritime nations.

ANNEX A

LIST OF PARTICIPANTS

Admiral Arthur W. Radford, USN (Ret.) - Chairman, MRAC Panel on Wartime Use of the U. S. Merchant Marine; Chairman, Project WALRUS

Dr. Russell L. Ackoff, Director, Operations Research Group, Case Institute of Technology

Commander Roy G. Anderson, USN, Hull Design Branch, Ship Design Division, Department of the Navy

Professor Harry Benford, Executive Director, Maritime Research Advisory Committee, NAS-NRC

Major General Frank S. Besson, Jr., USA, Chief of Transportation, U. S. Army Transportation Corps

Mr. Richard W. Black, Marine Transport Division, U. S. Army Transportation Research and Engineering Command, Fort Eustis, Virginia

Mr. William H. Bozman, Budget Examiner, Bureau of the Budget, Executive Office of the President

Dr. William N. Breswick, Naval Warfare Research Center, Stanford Research Institute

Dr. Franklin C. Brooks, Technical Director, Project WALRUS

Commander John I. Bryan, USN, Anti-Submarine Warfare Branch, OPNAV, Department of the Navy

Dr. P. B. Buck, Director of San Francisco Office, Maritime Cargo Transportation Conference, NAS-NRC

Dr. Paul W. Cherington, Professor of Business Administration, Graduate School of Business Administration, Harvard University

Colonel Robert A. Cliffe, USA, Commanding Officer, Combat Development Group, U. S. Army Transportation Corps, Fort Eustis, Virginia

Vice Admiral Edward L. Cochrane, USN (Ret.), Chairman, Division of Engineering and Industrial Research, NAS-NRC

Mr. John S. Coleman, Executive Secretary, Division of Physical Sciences, NAS-NRC

Mr. John P. Comstock, Naval Architect, Newport News Shipbuilding and Dry Dock Company

Mr. Raymond P. Delrich, Transportation Analyst, Maritime Cargo Transportation Conference, NAS-NRC

Rear Admiral Glynn R. Donaho, USN, Director, Logistics Plans, OPNAV, Department of the Navy

Mr. Samuel E. Eastman, Manager, Washington Research Office, Technical Operations, Inc.

Mr. John L. Eyre, Transportation Staff, Arthur D. Little, Inc.

Dr. Allen R. Ferguson, Director of Research, The Transportation Center, Northwestern University

Mr. Macon Fry, Operations Analyst, Operations Research Office, The Johns Hopkins University

Lieutenant Commander Herman L. Garren, Jr., USN, Office of Naval Intelligence, OPNAV, Department of the Navy

Rear Admiral Elton W. Grenfell, USN, Assistant Chief of Naval Operations (Logistics), Department of the Navy

Mr. George R. Griffiths, Special Assistant to the Deputy Maritime Administrator, Maritime Administration

Dr. Albert G. Hill, Professor of Physics, Massachusetts Institute of Technology

Mr. Ludwig C. Hoffmann, Chief, Office of Ship Construction, Maritime Administration

Commander Wayne Hoof, USN, Hull Design Branch, Ship Design Division, Department of the Navy

Dr. Edward L. Katzenbach, Jr., Assistant to the President, Brandeis University

Mr. Robert B. Keating, Staff Engineer, Maritime Research Advisory Committee, NAS-NRC; Executive Secretary, Project WALRUS

Brigadier General Laurence B. Kelley, USAF, Director, Logistics Plans, Department of the Air Force

Mr. Charles V. Krebs, Analyst, Technical Staff, Weapons Systems Evaluation Group, Department of Defense

Dr. James R. Larkin, Senior Operations Analyst, Operations Evaluation Group, Department of the Navy

Dr. Finn J. Larsen, Vice-President, Research, Minneapolis-Honeywell Regulator Company

Professor Edward V. Lewis, Head, Ship Division, Davidson Laboratory, Stevens Institute of Technology

Mr. Douglas C. MacMillan, President, George G. Sharp, Inc.

The Honorable Clarence G. Morse, Maritime Administrator

Dr. Robert W. Oliver, Naval Warfare Research Center, Stanford Research Institute

Mr. Carroll Perry, Jr., Chief, Program Planning Office, Maritime Administration

Dr. Ralph W. E. Reid, Assistant Director, Bureau of the Budget, Executive Office of the President

Captain Cassius D. Rhymes, Jr., USN, Coordinator, Inter-Agency and Maritime Affairs, Transportation Branch, OPNAV, Department of the Navy

Mr. Vincent P. Rock, Deputy Director for Program and Policy, Office of Civil and Defense Mobilization, Executive Office of the President

Mr. Benjamin F. Ryan, Assistant for Materiels Handling, Equipment and Facilities Division, Department of the Air Force

Mr. Raymond S. Stevens, President, Arthur D. Little, Inc.

Lieutenant Colonel Rufus B. Thompson, USMC, Logistics Operations Officer, Plans and Operations Branch, G-4, Marine Corps Headquarters

Mr. Johannes Vrugtman, Combat Development Group, U. S. Army Transportation Corps, Fort Eustis, Virginia

GUESTS

Mr. Walter B. Chambers, Jr., Program Planning Officer, Maritime Administration

Rear Admiral Walter C. Ford, USN (Ret.), Deputy Maritime Administrator

Rear Admiral E. G. Fullinwider, USN (Ret.), Director, Maritime Cargo Transportation Conference, NAS-NRC

Mr. Owen R. Jones, Deputy Assistant Director for Transportation, Office of Civil and Defense Mobilization, Executive Office of the President

Mr. Howard J. Marsden, Port Development Officer, Maritime Administration

Brigadier General J. M. Masters, Sr., USMC, Assistant Chief of Staff, G-2, Marine Corps Headquarters

Dr. Brian O'Brien, Chairman, Division of Physical Sciences, NAS-NRC

Major General H. R. Paige, USMC, Assistant Chief of Staff, G-4, Marine Corps Headquarters

Vice Admiral Ralph E. Wilson, USN, Deputy Chief of Naval Operations (Logistics), Department of the Navy

ANNEX B

PROJECT WALRUS ORGANIZATION

Steering Committee

Chairman--Admiral Arthur W. Radford, USN (Ret.)

Dr. Franklin C. Brooks, Technical Director, Project WALRUS
Mr. Robert B. Keating, Staff Engineer-Executive Secretary, Project WALRUS
Dr. Edward L. Katzenbach, Jr., Chairman, Team 1
Dr. Finn J. Larsen, Chairman, Team 2
Dr. Albert G. Hill, Chairman, Team 3
Mr. Douglas C. MacMillan, Chairman, Team 4
Dr. Russell L. Ackoff, Chairman, Team 5
The Honorable Clarence G. Morse, Observer
Vice Admiral Edward L. Cochrane, USN (Ret.)
Mr. John S. Coleman
Professor Harry Benford

Editorial Team

Chairman--Dr. Franklin C. Brooks

Professor Harry Benford
Mr. John S. Coleman
Colonel Robert A. Cliffe, USA
Dr. Edward L. Katzenbach, Jr.
Mr. Robert B. Keating
Captain Cassius D. Rhymes, Jr., USN

Study Teams (First Half of Conference)

Team 1--Transportation Requirements, 1960-1965

Chairman--Dr. Edward L. Katzenbach, Jr.

Colonel Robert A. Cliffe, USA
Mr. Raymond P. Delrich
Captain Cassius D. Rhymes, Jr., USN
Mr. Benjamin F. Ryan
Lieutenant Colonel Rufus B. Thompson, USMC

Team 2--Transportation Requirements, 1965-1975

Chairman--Dr. Finn J. Larsen

Major General Frank S. Besson, Jr., USA
Dr. William N. Breswick
Dr. Paul W. Cherington
Rear Admiral Glynn R. Donaho, USN
Dr. Allen R. Ferguson
Rear Admiral Elton W. Grenfell, USN
Brigadier General Laurence B. Kelley, USAF

Team 3--Enemy Capabilities and Our Countermeasures

Chairman--Dr. Albert G. Hill

Commander John I. Bryan, USN
Mr. Macon Fry
Lieutenant Commander Herman L. Garren, Jr., USN
Mr. Charles V. Krebs
Dr. James R. Larkin

Team 4--Technological Possibilities

Chairman--Mr. Douglas C. MacMillan

Commander Roy G. Anderson, USN
Professor Harry Benford
Mr. Richard W. Black
Mr. John P. Comstock
Mr. John L. Eyre
Mr. Ludwig C. Hoffmann
Commander Wayne Hoof, USN
Professor Edward V. Lewis

Team 5--Systems Analysis

Chairman--Dr. Russell L. Ackoff

Mr. William H. Bozman
Dr. P. B. Buck
Vice Admiral Edward L. Cochrane, USN (Ret.)
Mr. Samuel E. Eastman
Mr. George R. Griffiths
The Honorable Clarence G. Morse
Dr. Robert W. Oliver
Dr. Ralph W. E. Reid
Mr. Vincent P. Rock
Mr. Raymond S. Stevens
Mr. Johannes Vrugtman

Study Teams (Second Half of Conference)

Team A. Limited Sea War

Chairman--Dr. Albert G. Hill

Commander John I. Bryan, USN
Mr. Macon Fry
Mr. Charles V. Krebs
Dr. Finn J. Larsen

Team B. Role of Merchant Marine in General Nuclear War

Chairman--Dr. William N. Breswick

Brigadier General Laurence B. Kelley, USAF
Mr. Vincent P. Rock
Mr. Benjamin F. Ryan

Team C. Labor Relations

Chairman--Dr. Russell L. Ackoff

Mr. William H. Bozman
Mr. Raymond P. Delrich
Mr. Raymond S. Stevens

Team D. Maritime Administration Research and Development

Chairman--Mr. Douglas C. MacMillan

Mr. John P. Comstock
Mr. Ludwig C. Hoffmann

Team E. Foreign Resources

Chairman--Mr. George R. Griffiths

Commander Roy G. Anderson, USN
Dr. Paul W. Cherington
Dr. Allen R. Ferguson

Team F. Special Cargo Ships for Military Use

Chairman--Mr. Johannes Vrugtman

Major General Frank S. Besson, Jr., USA
Mr. Richard W. Black
Lieutenant Colonel Rufus B. Thompson, USMC

Secretarial Staff

Mrs. Pauline T. Adams
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Miss Agnes S. Larson
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Miss Ethel P. Powers
Miss Virginia C. Wellborn, Librarian

ANNEX C

BACKGROUND BRIEFINGS

(This Annex is a listing of the background briefings presented during the first week of Project WALRUS.)

Government

"Present State of the U. S. Merchant Marine"	The Honorable Clarence G. Morse, Maritime Administrator
"The Role of the Merchant Marine in National Security"	Mr. George Weber, Staff Officer, National Security Council
"Role of the Office of Civil and Defense Mobilization in Merchant Marine Planning and Mobilization"	Mr. Vincent P. Rock, Deputy Director for Program and Policy, Office of Civil and Defense Mobilization
"Major Programs in the Office of Civil and Defense Mobilization in Merchant Marine Planning and Mobilization"	Mr. Owen R. Jones, Deputy Assistant Director for Transportation, Office of Civil and Defense Mobilization
"The Possible Impact of Nuclear Attack on the U. S. Transportation System and Related Resources"	Mr. H. Burke Horton, Director, Operations Research Office, Office of Civil and Defense Mobilization
"The Role of the Merchant Marine in Support of Foreign Policy"	Mr. H. Gardner Ainsworth, Deputy Director, Office of Transport and Communications, Department of State
"Economic Capabilities of the Sino-Soviet Bloc Merchant Marine 1960-1975"	Central Intelligence Agency

Military

"Military Sea Transportation Service Responsibilities and Capabilities for Sea Transportation in Wartime"	Commander C. D. Davol, Jr., USN, Plans and Policy, Military Sea Transportation Service
"Naval Control of Shipping"	Captain F. C. Snow, USN, Head, Shipping Control Branch, Fleet Operations Division, OPNAV, Department of the Navy
"The Effects of Nuclear Weapons on the U. S. Merchant Marine in a Future War"	Commander P. H. Shropshire, Jr., USN, Head, Weapons Employment Branch, Atomic Energy Division, OPNAV, Department of the Navy
"Surface-to-Air Missiles as Armament on Merchant Ships"	Lieutenant Commander D. Wadsworth, USN, Guided Missiles Division, OPNAV, Department of the Navy

"The Soviet Naval Threat Against the Overseas Transport Systems"	Lieutenant Commander H. L. Garren, Jr., USN, Office of Naval Intelligence, OPNAV, Department of the Navy
"Naval Countermeasures to the Threat Against the Overseas Transport System"	Captain R. M. Pitts, USN, Assistant Director, Undersea Warfare Division, OPNAV, Department of the Navy
"Design Criteria for National Defense Features of Merchant Ships"	Captain J. J. Stilwell, USN, Ship Design Division, Bureau of Ships, Department of the Navy
"Military Sea Transportation Service and the Merchant Marine in the Amphibious Picture"	Commander J. G. Drew, USN, Surface Warfare Division, OPNAV, Department of the Navy
"Mission and Organization of the U. S. Marine Corps" "Modern Doctrine of Amphibious Assault" "Participation of Marine Corps Under Various War Conditions"	Lieutenant Colonel J. Kisgen, USMC, Operations and Training Branch, G-3, Marine Corps Headquarters
"Marine Corps Amphibious Lift Requirements" "Possible Requirements for U. S. Merchant Marine"	Lieutenant Colonel Rufus B. Thompson, Jr., USMC, Logistics Operations Officer, Plans and Operations Branch, G-4, Marine Corps Headquarters
"Desired Characteristics of Future Merchant Ships"	Lieutenant Colonel P. H. Hahn, USMC, Development Branch, G-4, Marine Corps Headquarters
U. S. Army Presentation	Colonel Robert A. Cliffe, USA, Commanding Officer, Combat Development Group, U. S. Army Transportation Corps
U. S. Air Force Presentation	Mr. B. F. Ryan, Assistant for Materiels Handling, Equipment and Facilities Division, Department of the Air Force Major J. J. Cameron, USAF, Equipment and Facilities Division, Department of the Air Force
"Recent Operations Evaluation Group Work Concerned with Convoys and Merchant Ships"	Dr. James R. Larkin, Senior Operations Analyst, Operations Evaluation Group, Department of the Navy
"Vehicles for Overseas Transportation"	Professor Edward V. Lewis, Head, Ship Division, Davidson Laboratory, Stevens Institute of Technology

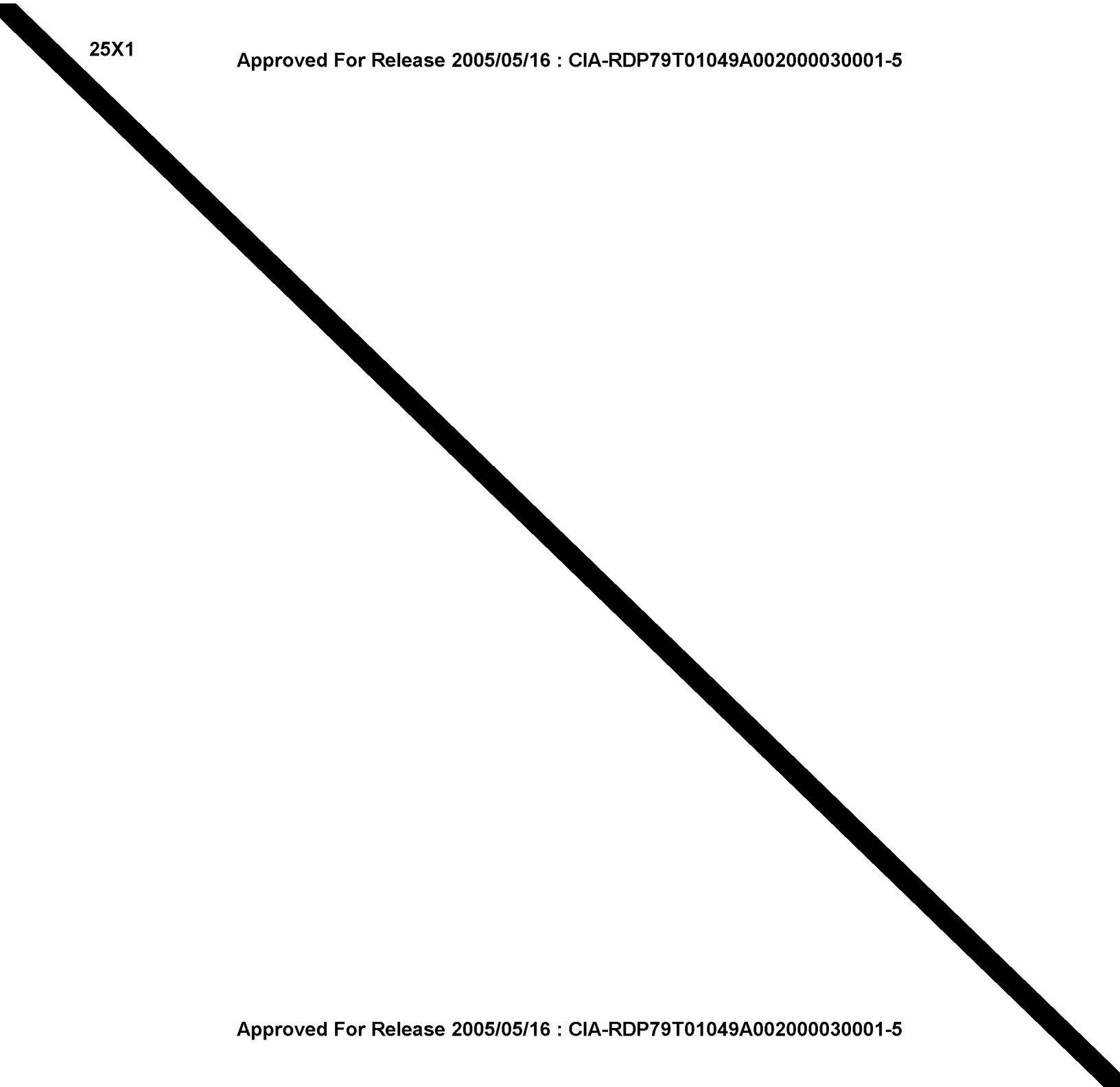
"Advanced Design at Electric Boat"	Mr. R. D. Briggs, Mr. J. V. Harrington, Mr. M. Weiser, Electric Boat Div. of General Dynamics Corp.
"The Non-Military Use of the Merchant Marine"	Dr. Allen R. Ferguson, Director of Research, The Transportation Center, Northwestern University
"Special Cargo Ship for Military Use"	Lieutenant Colonel J. F. Wright, Jr., USA, U. S. Army Transportation Research and Engineering Command Major Geoffrey E. Childs, British Army, U. S. Army Transportation Research and Engineering Command

The National Academy of Sciences—National Research Council is a private, nonprofit organization of scientists, dedicated to the furtherance of science and to its use for the general welfare. The Academy itself was established in 1863 under a Congressional charter signed by President Lincoln. Empowered to provide for all activities appropriate to academies of science, it was also required by its charter to act as an adviser to the Federal Government in scientific matters. This provision accounts for the close ties that have always existed between the Academy and the Government, although the Academy is not a government agency.

The National Research Council was established by the Academy in 1916, at the request of President Wilson, to enable scientists generally to associate their efforts with those of the limited membership of the Academy in service to the nation, to society, and to science at home and abroad. Members of the National Research Council receive their appointments from the President of the Academy. They include representatives nominated by the major scientific and technical societies, representatives of the Federal Government, and a number of members at large. In addition, several thousand scientists and engineers take part in the activities of the Research Council through membership on its various boards and committees.

Receiving funds from both public and private sources, by contribution, grant, or contract, the Academy and its Research Council thus work to stimulate research and its applications, to survey the broad possibilities of science, to promote effective utilization of the scientific and technical resources of the country, to serve the Government, and to further the general interests of science.

The Maritime Research Advisory Committee is under the joint administrative sponsorship of the Divisions of Engineering and Industrial Research and of Physical Sciences of the Academy—Research Council. The Committee was formed in 1958 at the request of the Maritime Administration of the Department of Commerce. The purposes of the Committee are to determine the most profitable short and long range research objectives of the Maritime Administration, to translate these objectives into specific suggestions for research and development indicating relative importance and priorities, and to delineate methods by which the research and development indicated can be effectively carried out.



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Nana,

Alvin brought this in -
it's a finished report of what
she brought in yesterday for
Dr Guthrie's file - ok